TECHNOLOGY DEPT.

POST-CONVENTION ISSUE June 1950

THE FOUNDRY

wherever metals are cast...

PUBLIC LIBRARY

42 Years of service to the foundry industry

OSBORN

- MOULDING MACHINES
- CORE BLOWERS

FOUNDRY EQUIPMENT MEMBER FEMA MANUFACTURERS ASSOCIATION INC.

THE OSBORN MANUFACTURING COMPANY
5401 Hamilton Avenue Cleveland 14, Ohio

why PURITE makes IRON Cleaner · CASTINGS Stronger

When foundry after leading foundry changes to Purite and then continues to use it, you know there must be good practic reasons for the success of this economical desulphurizer and cupola flux. There are! Just note these outstanding advantages:

1. **Purite gives 100% fluxing action in the cupola – 100% desulphurizing action in the ladle.**
2. **Purite gets to the iron quicker – no faster desulphurizer made.**
3. **Purite is time-tested and proven for unsurpassed desulphurizing uniformity.**
4. **Purite comes in 2-lb. pigs – no weighing or measuring required.**
5. **Purite is 100% fused soda ash—you do not pay for inert materials.**
6. **Purite does not crumble—no waste—no dust.**
7. **Purite can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without deterioration.**

These day-to-day benefits explain why leading foundries throughout the country regard Purite as the foremost cupola flux and ladle desulphurizing agent. Write today for specific information on how Purite can improve your iron. Mathieson Chemical Corporation, Mathieson Building, Baltimore 3, Maryland.

Purite is sold by all leading foundry supply houses in the United States and Canada.

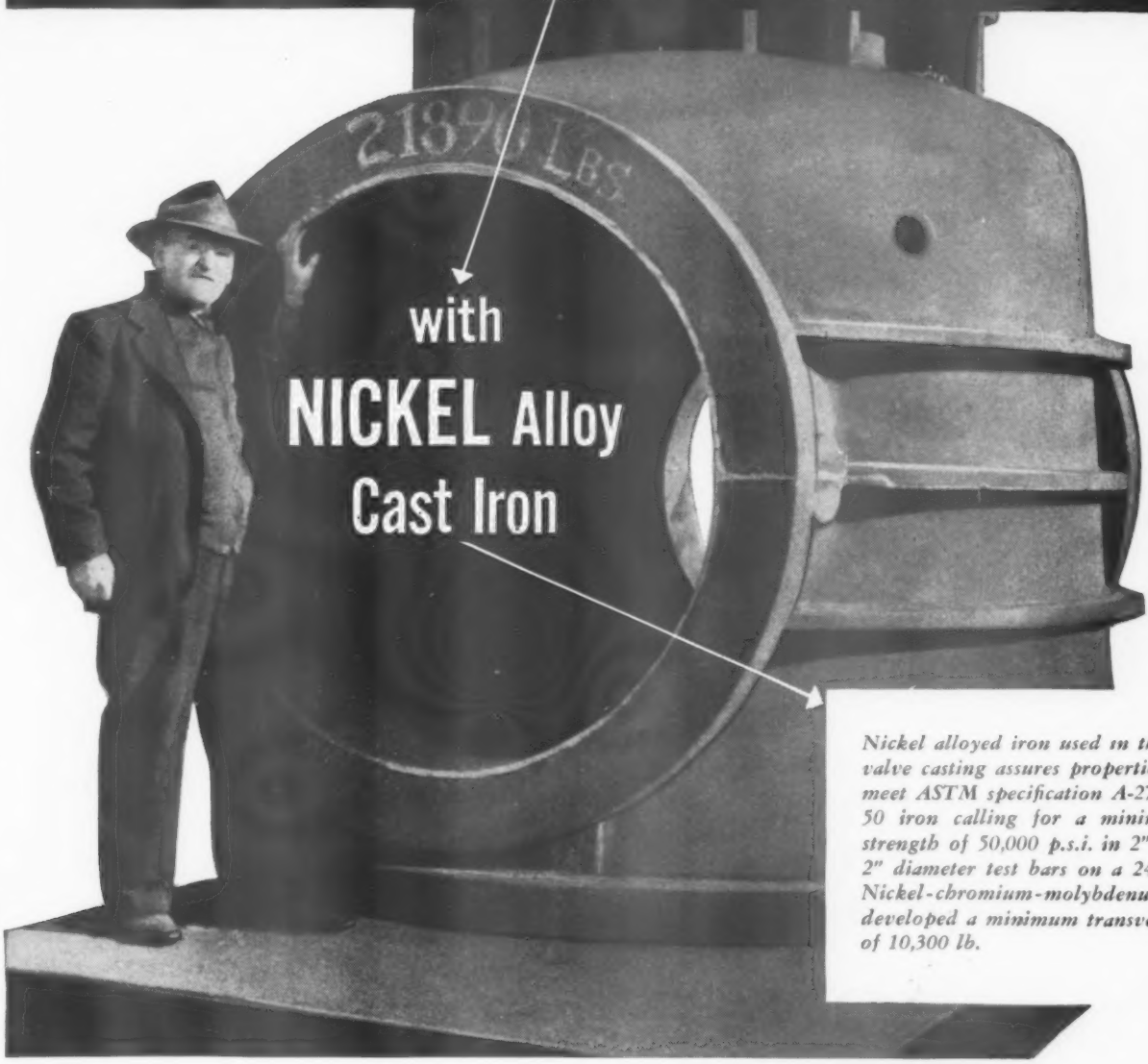
PURITE 100% FUSED SODA ASH

The Scientific Flux for Better Melting and Cleaner Iron

Mathieson
CHEMICALS

SERVING INDUSTRY, AGRICULTURE AND PUBLIC HEALTH

Kutztown Meets Specifications for Delaware Aqueduct Job



Nickel alloyed iron used in this 54" rotovalve casting assures properties needed to meet ASTM specification A-278-44T Class 50 iron calling for a minimum tensile strength of 50,000 p.s.i. in 2" sections. In 2" diameter test bars on a 24" span, this Nickel-chromium-molybdenum cast iron developed a minimum transverse strength of 10,300 lb.

Rotovalve bodies and plugs and related castings meeting every specification of New York City's Board of Water Supply, were produced by the Kutztown Foundry and Machine Corporation, Kutztown, Pa., in high test Nickel alloyed cast iron.

This is but one of thousands of examples that show how Nickel cast iron renders these basic advantages:—

IN THE FOUNDRY—Nickel aids the progressive foundry to meet high mechanical property specifications. It is employed in the production of engineering cast irons because it strengthens the pearlitic matrix of the iron, produces finer and more highly dispersed graphite and discourages the formation or retention of hard carbide particles.

IN THE MACHINE SHOP — Nickel cast irons provide readily machinable castings that take a smooth finish because of their improved structure and uniformity, particularly where changes in cross-section introduce difficulties and losses with unalloyed irons.

IN SERVICE LIFE—Nickel cast irons are strong, pressure-tight and resistant to graphitic corrosion, a frequent source of trouble in valves, pipes and fittings.

EMBLEM OF INCO SERVICE
TRADE MARK

Over the years, International Nickel has accumulated a fund of useful information on the selection, fabrication, treatment and performance of engineering alloy steels, stainless steels, cast irons, brasses, bronzes and other alloys containing Nickel. This information and data are yours for the asking. Write for "List A" of available publications.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

A STAR PERFORMER in All Foundries

C-120 GRADE
CROWN HILL
100 LBS
100 LBS
SEACOAL FACING
"CROWN HILL MEANS QUALITY SEACOAL"
MANUFACTURED ONLY BY
THE FEDERAL FOUNDRY SUPPLY CO
CLEVELAND, OHIO
CROWN HILL, W. VA. - CHICAGO - DETROIT - MILWAUKEE
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CHATTANOOGA, TENN. - ST. LOUIS, MO.

FIGURES FROM BUREAU OF MINES
DEPT. OF INTERIOR OF THE U. S.
Moisture Free

PROXIMATE ANALYSIS

Volatile Matter (V.C.M.)	38.9%
Fixed Carbon	57.4%
Ash	3.7%
	100.0%

ULTIMATE ANALYSIS

Hydrogen	5.4
Carbon	82.0
Nitrogen	1.6
Oxygen	6.6%
Sulphur	7%
Ash	3.7%
	100.0%

★ **Star performer Crown Hill Seacoal Facing has real foundry appeal:**

A. It vents the mold quickly.

B. Eliminates hard spots.

C. Makes pooling easy.

There's a reason, in fact three reasons for these advantages: (1) Crown Hill is made from selected, high volatile flash coal; (2) it has extremely low sulphur content; (3) the fusion point of the little ash residue is 2980 degrees F.

Crown Hill does cut cleaning costs substantially. Try Crown Hill Seacoal Facing . . . made by the long-time friend of the foundries—The Federal Foundry Supply Company.

THE FEDERAL FOUNDRY SUPPLY COMPANY

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JUNE, 1950

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LINOIL at The Driver-Harris Co

HELPS TO MAKE H

If you're a malleable foundry, doing heat treating—or if you do any carburizing, cyaniding, or acid dipping—chances are you're using some of the heat resistant castings made by Driver-Harris.

These various products—pots, retorts, shafts, rollers, muffles—are cast from special iron-nickel-chromium alloys that bear the trade names "Nichrome", "Chromax", and "Cimet". They are used in equipment that operates at high temperatures. "Nichrome", for example, analyzes at 60% nickel and 15% chromium: It is the accepted alloy for mechanical uses at 2000°F. to 2100°F.

LINOIL is used in the Driver-Harris foundry for both cores and dry-sand facings. Cores vary in size from small sections up to the large retort cores. On all sizes, however, accuracy of casting dimensions is an important factor, particularly where wall sections are as thin as 1/4 to 5/16 inches.

But possibly LINOIL'S greatest contribution is its dependable performance, especially important where the cost per pound of casting is high. This dependability is one reason why thousands of foundrymen regularly specify LINOIL for their work.

ris Company, Harrison, New Jersey

E HEAT RESISTANT CASTINGS

Inspecting the LINOIL cores for a horizontal rotary retort. The inset shows a finished casting.

Checking the finish of the LINOIL-bonded dry sand facing on the mold of a horizontal retort. Metal will be poured at about 2800° F.

THE LINOIL THE LOGICAL OIL

WERNER G. SMITH COMPANY

(DIVISION OF ARCHER-DANIELS-MIDLAND COMPANY)

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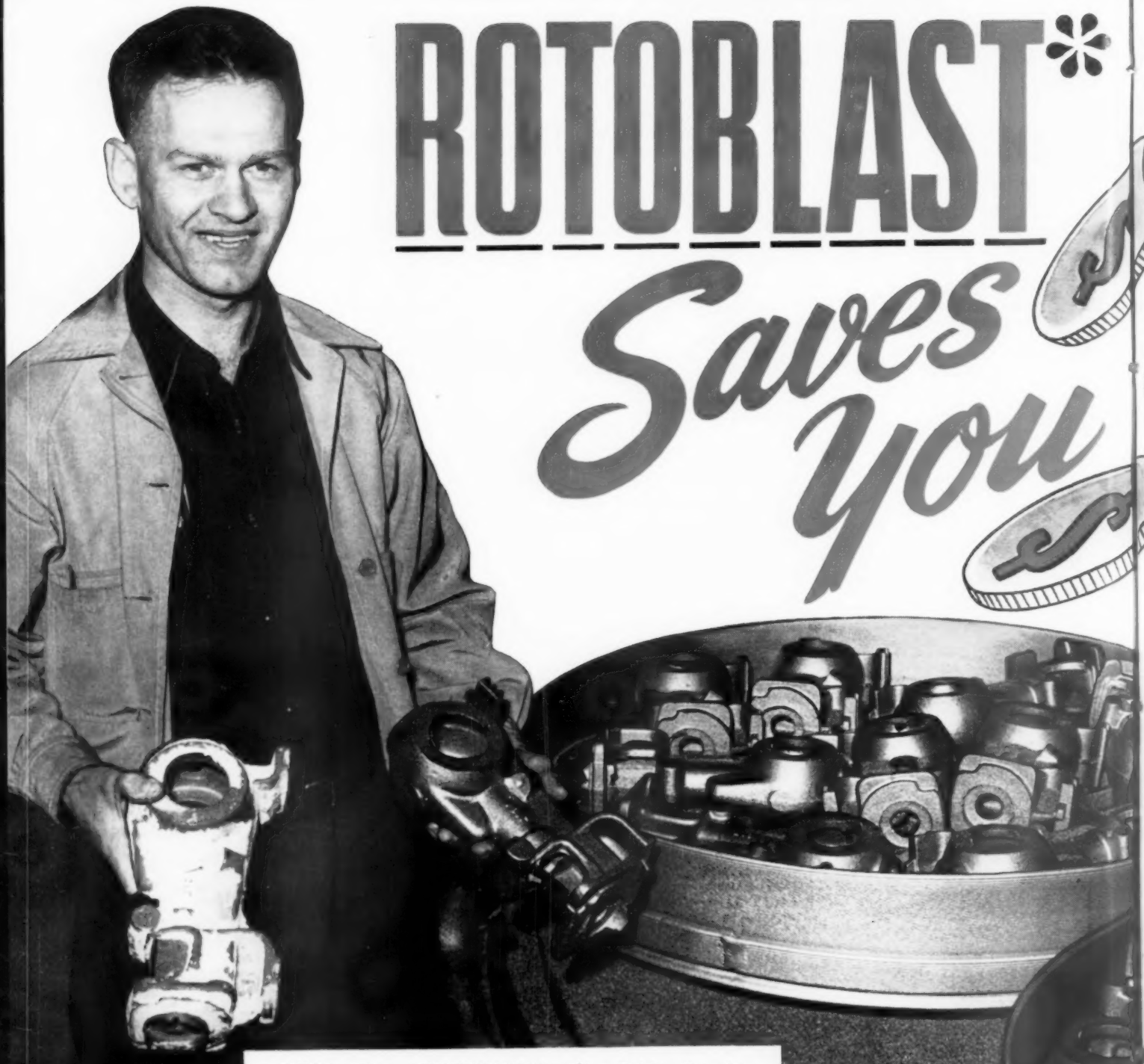
ROTOBLAST*

Saves you

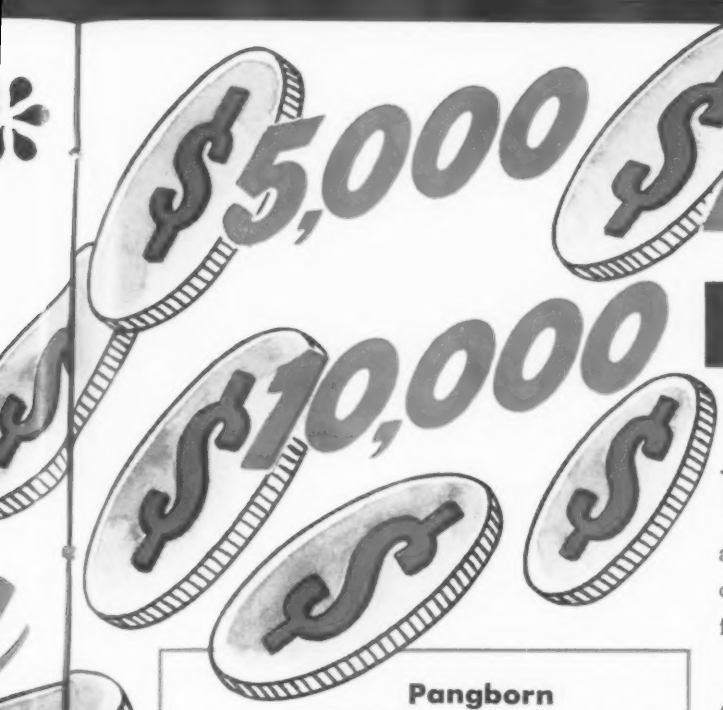


All Pangborn ROTOBLAST units—Tables, Barrels, Rooms, Table-Rooms or Continuous-Flo Barrels—are designed to clean your work faster and better, and at the same time *save you money*. See the chart at the right for actual savings as reported by satisfied ROTOBLAST users.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

Pangborn

* Trademark of Pangborn Corporation



on BLAST CLEANING!

USE ROTOBLAST and you save money! No matter what you clean: large or small castings, fragile or intricate castings, or any combination—your best bet is ROTOBLAST! Only Pangborn offers you a money-saving ROTOBLAST unit to fit the needs of any foundry, large, medium or small.

Look at the amount of cash ROTOBLAST has saved for actual foundries as reported below. *In every case* ROTOBLAST cut cleaning time, saved labor and maintenance and reduced operating expenses to the tune of thousands of dollars a year.

Pangborn ROTOBLAST saves you money these *five* ways:

SAVES LABOR: *One ROTOBLAST machine and operator can do as much as a two-man crew and old-fashioned equipment.*

SAVES SPACE: *In many cases, one ROTOBLAST machine replaces five or more old-fashioned machines, requires less space.*

SAVES TIME: *Cases on record prove ROTOBLAST can cut cleaning time up to 95.8% compared with old-style methods.*

SAVES POWER: *Modern ROTOBLAST uses but 15-20 h.p. compared to old-fashioned equipment requiring 120 h.p. for same job.*

SAVES TOOLS: *On work cleaned with ROTOBLAST, cutting tools last up to 2/3 longer because no scale is left to dull edges.*

SAVINGS MEAN PROFITS

Look to Pangborn for the Latest Developments in Blast Cleaning and Dust Control Equipment

USERS REPORT IMPRESSIVE SAVINGS WITH ROTOBLAST

ROTOBLAST UNIT	CASH SAVED	NAME OF USER
Table-Room	$5,452 on labor and maintenance	Champion Blower & Forge Co., Lancaster, Pennsylvania
Table-Room	$11,102 on labor alone	Lewistown Foundry, Lewistown, Pennsylvania
Room	$10,160 on labor alone	Harris-Seybold, Cleveland, Ohio
Barrel	$5,080 on labor alone	Yates-American Machine Co., Beloit, Wisconsin

Yes—ROTOBLAST offers the ideal solution to *your blast cleaning problems*. Cleaning efficiency is equally high, whether you operate at 50% or full capacity. To get *faster blast cleaning* in your plant—specify Pangborn ROTOBLAST!

GET THE FACTS! Find out how much money *you* can save with ROTOBLAST. Bulletin 214 contains technical details. Or send us your problem and we'll show you how ROTOBLAST can solve it. But write today . . . just address PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md.

MORE THAN 25,000 PANGBORN MACHINES SERVING INDUSTRY

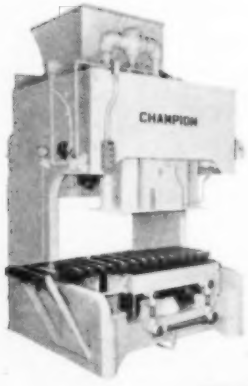
BLAST CLEANS CHEAPER

with the right equipment for every job

The "Automatic Age" Has Come to the Foundry Industry!

Automatic controls are available on the larger sizes of Champion core blowers. The precise timing made possible by Champion Automatic controls eliminates any uncertainty as to maintaining production schedules.

CB-18



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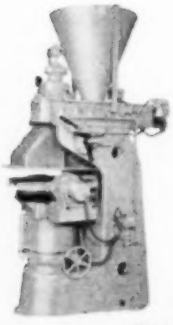

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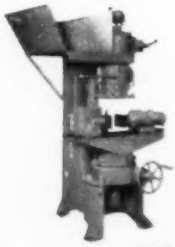

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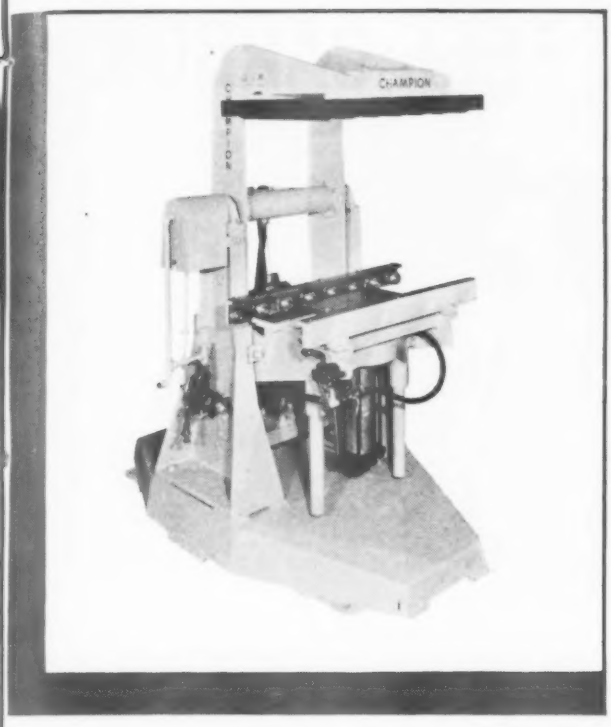
CB-5



The new Champion CR rollover and draw machine, in combination Champion core blowers, lends itself perfectly to automatic unit control.

WHAT ARE YOUR CORE OR MOLDING REQUIREMENTS?

The broad Champion line includes a molding machine and core blower to satisfy practically every requirement of the production foundry. Even job foundries use these efficient, easy-to-operate machines to good advantage. Let Champion production specialists show you the numerous features of the Champion method in core blowing and mold making.

and CHAMPION is ready with the outstanding development in Automatic and Semi-Automatic controls, as applied to molding machines and core blowers.

LATEST CHAMPION ACHIEVEMENT PUTS CORE AND MOLD MAKING ON SPLIT SCHEDULES!

SPEED!

Champion automatic controls eliminate the human factor. The timing of the operating cycle has been advanced beyond any former standard. Efficiency and productivity are immensely increased.

SIMPLICITY!

There's nothing bulky, intricate or difficult to regulate or operate on the Champion Automatic Controls. The relatively small space occupied by the electric-pneumatic unit is significant of its extreme simplicity and ruggedness.

Champion FOUNDRY AND MACHINE CO.

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Eliminate ASH AND FREE CARBON

with....

DELTA PERMI-BOND*

THE MODERN, SCIENTIFIC SEACOAL REPLACEMENT

DELTA PERMI-BOND is a specially prepared pure hydrocarbon, completely volatile at elevated temperatures. It decomposes to form a vapor-gas cushion, which is reducing in nature, and leaves only a trace (two tenths of 1% maximum) of ash.

Do not confuse DELTA PERMI-BOND with other sand additives or so-called "chemical sand-coating" cure-alls which may consist mainly of asphalt, or other petroleum by-product pitches dissolved in fuel oil or other solvents. DELTA PERMI-BOND is a scientific development protected by United States patents allowed.

*Licensed for foundry use under U. S. Patent 2256832.

NINE IMPORTANT ADVANTAGES

1. Always uniform. Manufactured under rigid chemical and physical control.
2. Eliminates ash and free carbon which contaminate your sand.
3. Greatly reduces gas, smoke, soot and dirt in the foundry.
4. Provides correct amount of vapor gas in the mold cavity which allows use of lower permeability sand without casting blows.
5. Increases dry strength properties of sand.
6. Prevents scabbing, buckling, rat-tailing and cutting, greatly reducing scrap castings.
7. Improves casting finish . . . cuts cleaning room costs to a minimum.
8. More economical to use: cuts sand costs.
9. Much cleaner, more foolproof than seacoal.

DELTA OIL PRODUCTS CO.

MILWAUKEE 9, WISCONSIN

Pangborn's free ABRASIVE ANALYSIS SERVICE

TAKES THE GUESSWORK out of ABRASIVES!

USE the wrong abrasives in your cleaning room and cleaning costs soar sky-high!

That's why Pangborn developed its free Abrasive Analysis Service. Now, instead of buying abrasives hit or miss, you can find out from a Pangborn Service Engineer which abrasive to use and *why!*

Picking the right abrasive requires the help of these trained men. The finish you want; the equipment you use, its age, condition and efficiency all must be considered when you select an abrasive.

For example: there's MALLEABRASIVE® Cases on record prove that when used as recommended it can cut cleaning costs up to 50% and more. "CERTIFIED" Shot and Grit are high-quality standard abrasives. Reports show they are ideal for hundreds of cleaning and finishing jobs. TRU-STEEL is another money-saver.

But which of these abrasives should you use? Pangborn Service Engineers have the answer to this problem. These men are backed by Pangborn's 46 years' experience with blast cleaning and pioneer work with metallic shot and grit. They can recommend the specific abrasive *which experience has proved* best for your work.

There is no obligation for this service. All you need do is tell us the type of equipment you use and what you clean. Write for a free recommendation today. Just address: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for the Latest Developments in Blast Cleaning and Dust Control Equipment

Pangborn

BLAST CLEANS CHEAPER with the right equipment for every job

You don't need a gypsy...

to foretell the future of this compressor!

Consider the evidence:

Gardner-Denver AA Compressors are known throughout the world for continuous service under all operating conditions.

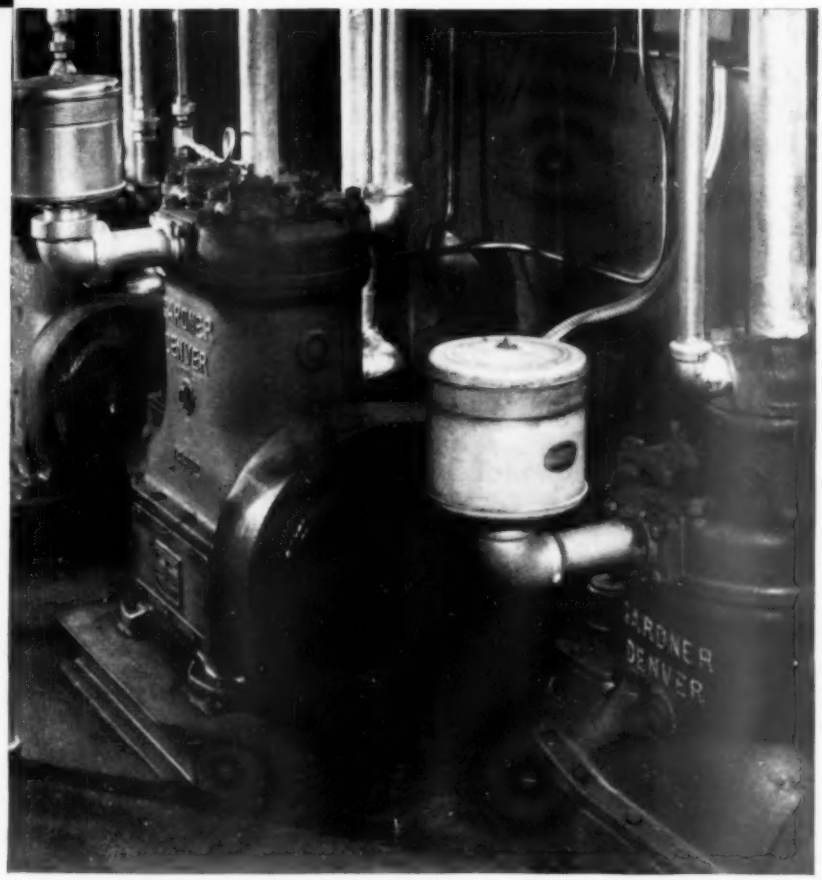
Look into the design:

Gardner-Denver AA Compressors are built to last, with quality features such as generous bearing areas, extra large water jackets and force feed lubrication.

You can safely predict:

A Gardner-Denver AA Compressor installed in your plant will assure a dependable source of compressed air for years to come — will save you money every year — on both operation and maintenance.

Write today for complete information on AA service records and construction features.



Gardner-Denver AA Vertical, Single-Stage, Water-Cooled Compressor. Capacities from 32 to 183.6 cubic feet displacement per minute.

Since 1859

USE COMPRESSED AIR FOR SAFETY CONVENIENCE FLEXIBILITY

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois

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PAYLOADERS Save Time and Money on these Jobs

How do You handle them?

Hundreds of Payloaders in Foundries are cutting casting costs by saving time, manual labor and money doing jobs that used to be dirty, back-breaking and costly. One man on a Payloader does a variety of loose and bulk material handling jobs faster, easier and cheaper.

They pick up, carry, pile, spread, windrow, dump, unload and load sand . . . handle sprues, slag, bond and broken cores . . . work indoors and out . . . go right to work saving dollars immediately because no expensive and time-consuming changes in plant layout or equipment are required.

If Payloaders are not yet cutting costs in your foundry get the full story from your Hough Payloader distributor, or write The Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.

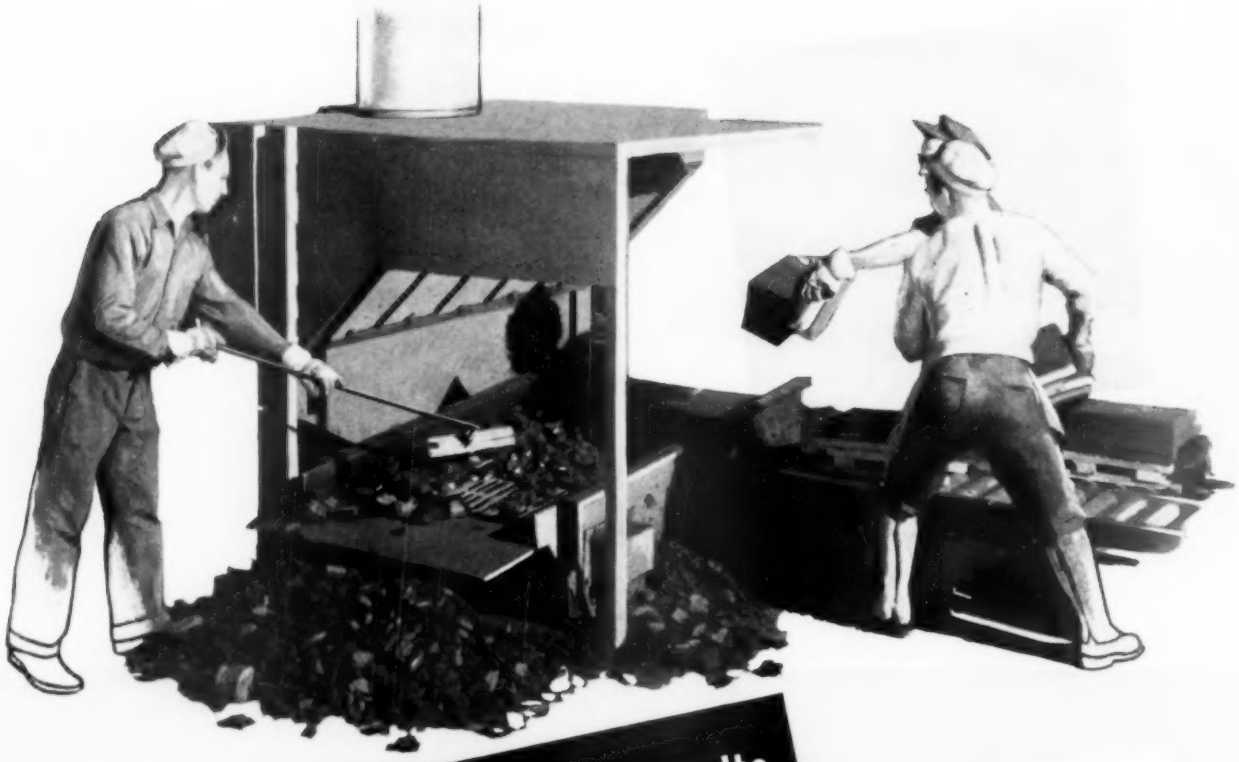
- Unload box cars.
- Carry sand, coke, scrap, limestone, etc., to storage.
- Transport materials to cupola.
- Transport and distribute sand to molding stations.
- Windrow sand for the cutter.
- Remove used sand from floors.
- Charge mullers, hoppers, tumbling barrels.
- Feed conveyors, elevators, mixers, screenerators.
- Remove cupola drops.
- Load trucks.
- Dispose of old sand, cores and other waste.
- Handle scrap and small castings.
- Clean up gangways, aisles and other areas.
- Load charge boxes.
- Load out trash, debris.
- Level dumps — dig and grade.
- Maintain private roadways.
- Handle coal, ashes, cinders.
- Do crane work — haul, push.
- Remove snow.

Send for Job Study No. 10 — it's full of authorized facts and photos on how one foundry cut costs with Payloaders.

SAY "HUFF"

HOUGH
PAYLOADER

Manufactured by THE FRANK G. HOUGH CO.



American Wheelabrator gets good results with SIMPLICITY SHAKEOUT UNIT

Typical Airless Wheelabrator Unit of which there are over 5,000 in use today in Industry for blast cleaning.

In under 20 minutes, an entire heat of 260 to 300 molds containing wheel blade castings are handled on this Simplicity Shakeout installed in the American Wheelabrator & Equipment Corporation foundry at Mishawaka, Indiana. These castings average 4 to 5 lbs., and the Wheelabrator foundry reports that *much higher production* has been maintained since the installation of the Simplicity equipment. Simplicity Shakeouts are available in all sizes ranging from the big heavy duty "Quads" to a 2′ x 3′ Model A to handle *every type of production requirement.* If you're having shakeout trouble in your foundry just call for a Simplicity sales engineer . . . he can give you the answer. Why not write today.

FOR CANADA:
Canadian Bridge
Engineering Co. Ltd.
Walkerville, Ontario

Simplicity
TRADE MARK REGISTERED

ENGINEERING COMPANY • DURAND, MICHIGAN

Newest Achievement in CARL-MAYER VERTICAL CORE OVENS

AND CONTINUOUS MONORAIL CORE OVENS

•

Carl-Mayer Vertical Core Ovens, with the heating system described, are protected by Patent No. 2,257,180. Other patents pending.

Vertical Ovens (Figs. 1 and 2) are by Carl-Mayer, using the universally adopted recirculating heating system with sealed combustion chamber located between conveyor chains.

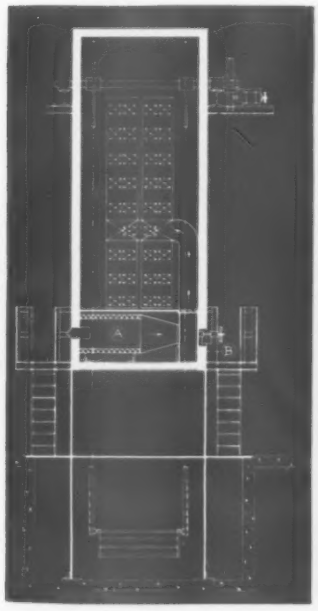


Fig. 1
NEW METHOD with heat fan inside oven.

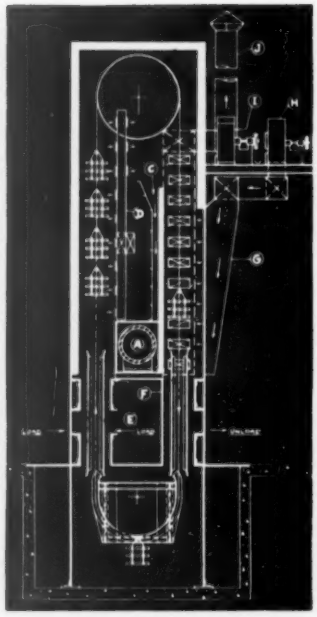


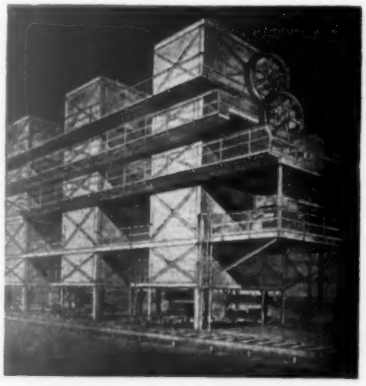
Fig. 2
Section showing conveyor travel thru pass, heating, cooling and exhaust system.

CONSIDER THIS HIGHLY IMPORTANT NEW DEVELOPMENT OF LOCATING THE HEAT FAN INSIDE OF OVEN (Fig. 1)

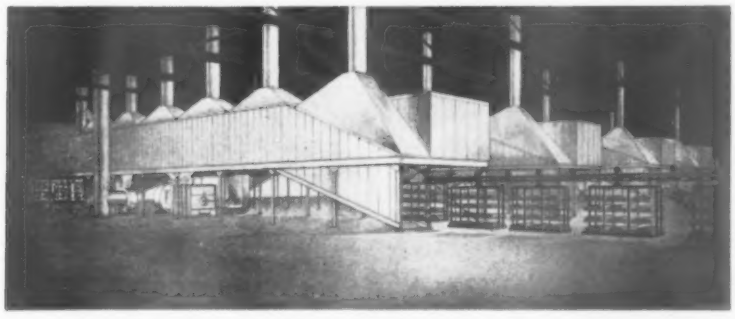
New added features are as follows:

(1) Saves platform space.
(2) Eliminating external duct reduces heat losses.
(3) Placing heat fan in oven also reduces heat losses, resulting in high operating efficiency.
(4) Elimination of external heat duct and fan insulation results in lower installation cost.
(5) Oven appearance is greatly improved and smoking eliminated from external heat ducts.

Write for full description of this and other vertical oven features guaranteeing faster baking, lower fuel consumption, smaller core losses, safer operation, *elimination of smoke, cooled cores at unloading station,* reduced labor cost.



Three outstanding Carl-Mayer Vertical Ovens at General Steel Castings Corp. Each oven is 67′ high, 80 tons per bake per oven.



Carl-Mayer Continuous Monorail Core Ovens
Patent No. 2,355,814

One of the largest Monorail installations in the U. S. A. (patent no. 2,355,814) made for the Ford Motor Company. Each oven is 170′ long, utilizing 1,200 feet of continuous monorail conveyor. Some of the outstanding advantages of these ovens are:

(1) Flexibility in core handling, bench to core rack.
(2) Uniform, fast baking, using the "Mayer" convection heater.
(3) Cores can be removed with bare hands at unloading station using Carl-Mayer patented design.
(4) Smoke nuisance is eliminated.

Typical Users of CARL-MAYER VERTICAL AND MONORAIL OVENS

Aluminum Co. of America
Burt Foundry Co.
Cadillac Motor Co.
Eclipse Aviation Corp.
Electric Autolite Co.
Ford Motor Co.
Fremont Foundry Co.
General Motors Corp.
General Steel Castings Co.
Harrison Radiator Co.
Henry Kaiser
H. B. Salter Co.
McKinnon Industries
Quality Castings Co.
Packard Motor Co.
Richmond Radiator Co.
Union Brass and Metals Mfg. Co.
West Michigan Steel Castings Co.
A. C. Williams Co.

THE CARL-MAYER CORPORATION

3030 Euclid Ave., Cleveland, Ohio

Core and Mold Ovens—all types. Backed by over 30 years' experience

Profits Multiply...

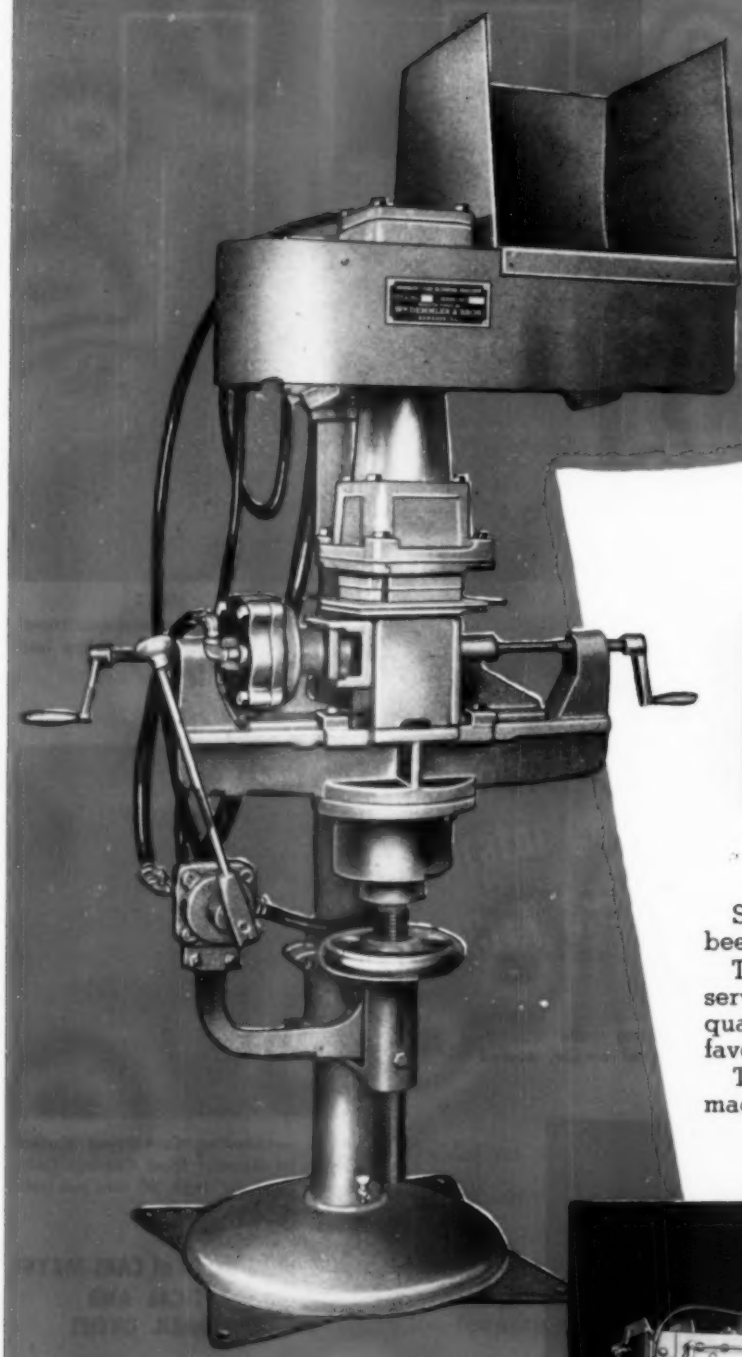
with

DEMMLER

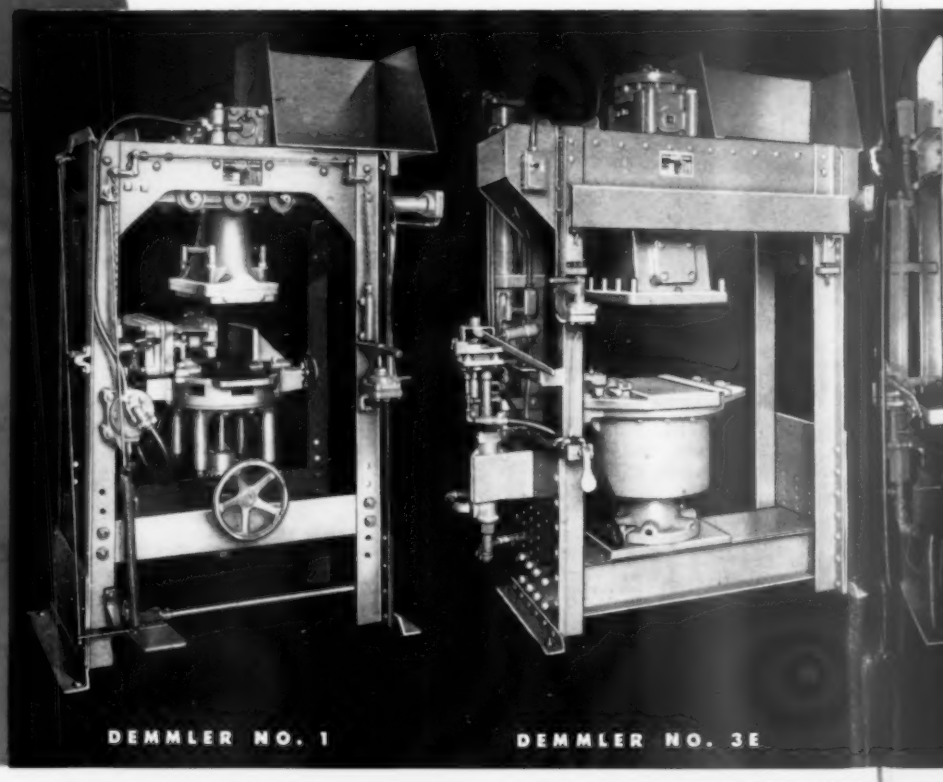
Since 1911, efficient DEMMLER Core Blowers have been making money for foundries large and small.

Their reputation for dependable — trouble-free service, coupled with their ability to produce high quality cores faster at less cost has made them a favorite everywhere!

The DEMMLER line is a complete line. There is a machine to meet every core blowing requirement.

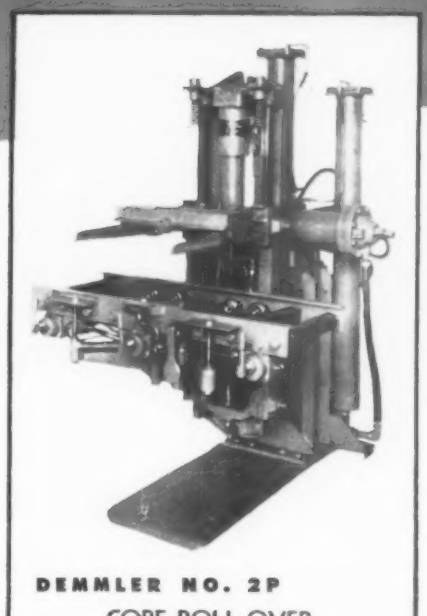


DEMMLER
NO. 55

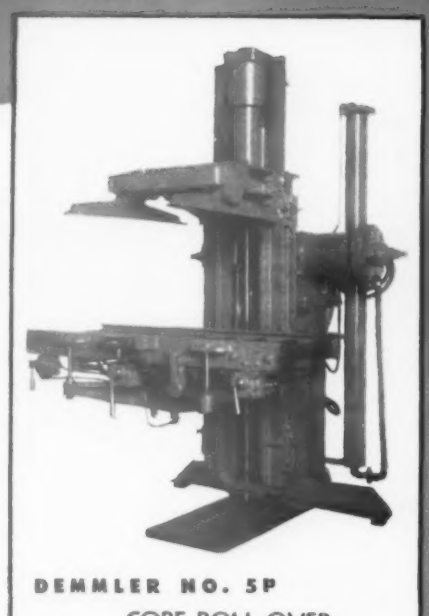


DEMMLER NO. 1

DEMMLER NO. 3E



DEMMLER NO. 2P
CORE ROLL-OVER
DRAW MACHINE



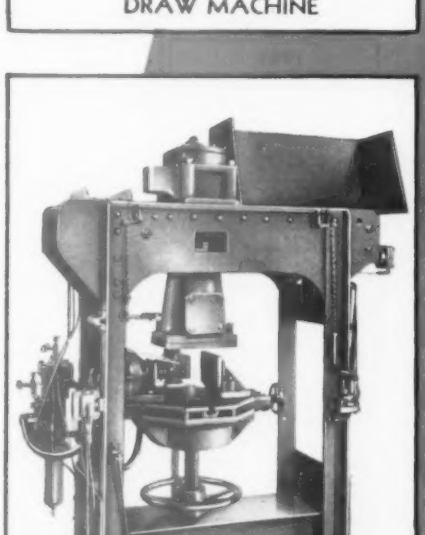
DEMMLER NO. 5P
CORE ROLL-OVER
DRAW MACHINE

Core Blowers

Each machine features both horizontal and vertical adjustments for quick, easy job changes.

Why not join the thousands who depend upon DEMMLER Core Blowers to assure them greater profits through an efficiency that sets the standards for the industry?

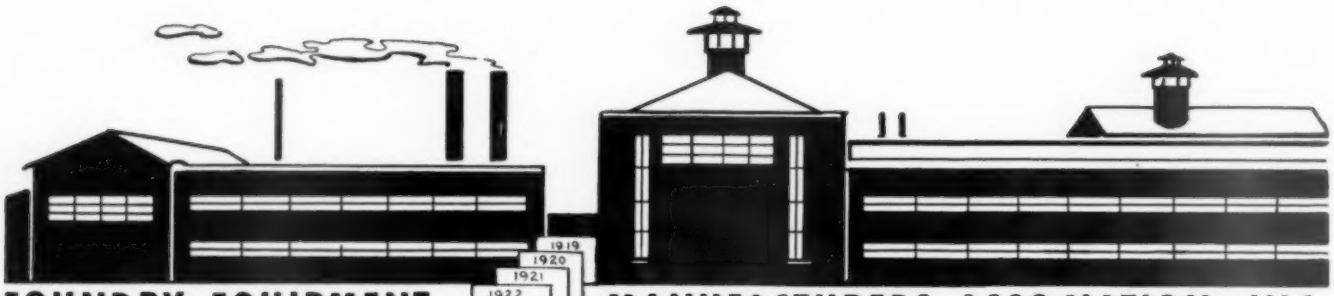
Descriptive literature on any of the machines illustrated will be sent on request. Write for yours TODAY!



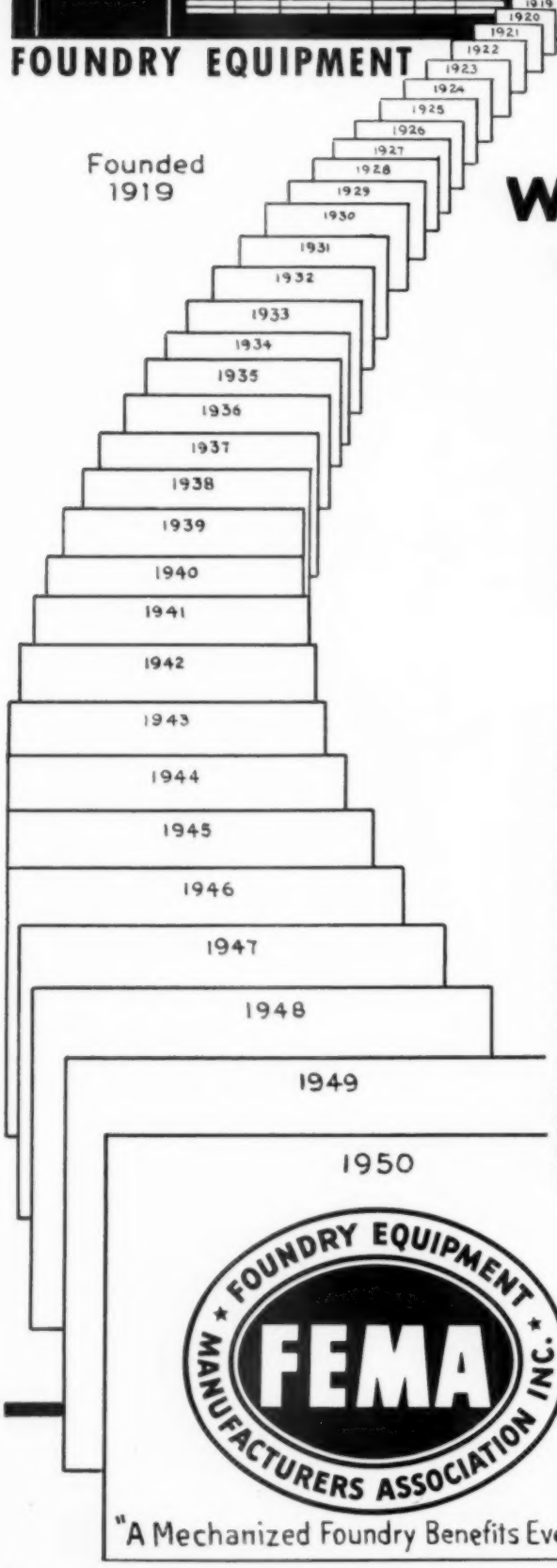
DEMMLER NO. 2

DEMMLER NO. 4E

Wm. DEMMLER & Bros
Kewanee, Illinois



FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION, INC.



What F. E. M. A. does for the Foundry Industry

- **Fosters member co-operation**
- **Improves trade relations**
- **Promotes industry recognition**
- **Stimulates foundry research**
- **Disseminates progress reports**
- **Co-operates with allied organizations**
- **Compiles trade information**
- **Stimulates better foundry equipment**

MEMBERSHIP ROSTER

Ajax Flexible Coupling Co. Inc.
Allis-Chalmers Manufacturing Company
Alloy Metal Abrasive Company
American Air Filter Co. Inc.
American Wheelabrator & Equipment Corporation
Arcade Manufacturing Co., Div. of Rockwell Manufacturing Co.
Baker Perkins Incorporated
The C. O. Bartlett & Snow Company
Beardsley & Piper, Div. of Pettibone Mulliken Corp.
The Berkshire Manufacturing Company
Buell Engineering Company, Inc.
Edwin S. Carman, Inc.
Clearfield Machine Company
Cleveland Metal Abrasive Company
The Conover Engineering Company
Davenport Machine & Foundry Company
Detroit Electric Furnace Div., Kuhlman Electric Company
The Federal Foundry Supply Company
The Fellows Corporation
The Foundry Equipment Company
Herman Pneumatic Machine Company
Hickman, Williams & Company
Hines Flask Company
Industrial Equipment Company
Iron Lung Ventilator Company
The Jeffrey Manufacturing Company
Johnson-March Corporation
Link-Belt Company
The MacLeod Company
Mathews Conveyer Company
Milwaukee Foundry Equipment Company
Modern Equipment Company
National Metal Abrasive Company
Newaygo Engineering Company
New Haven Vibrator Company
Norwalk Valve Company
The Osborn Manufacturing Company
Pangborn Corporation
Parsons Engineering Corporation
Penn Iron Works
Pittsburgh Crushed Steel Company
N. Ransohoff, Inc.
Robins Conveyors Div., Hewitt-Robins, Inc.
Roots-Connersville Blower Corporation
Royer Foundry & Machine Company
Ruemelin Manufacturing Company
Claude B. Schneible Company
Schramm, Incorporated
Simplicity Engineering Company
The W. W. Sly Manufacturing Company
S.P.O., Incorporated
Spencer Turbine Company
Standard Conveyor Company
Steelblast Abrasives Company
Sturtevant Div., Westinghouse Electric Corporation
Tabor Manufacturing Company
Thermix Corporation
Vapor Blast Manufacturing Company
Wadsworth Equipment Company
W. B. Wallis, Pres. (Pittsburgh Lectromelt)
Whiting Corporation

Address:

Engineers Building
Cleveland 14, Ohio

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC.
FEMA

"A Mechanized Foundry Benefits Everyone"

A Mark of Product Reliability fostered through progressive group activity and leadership in serving the foundry industry

Increase Customer Satisfaction

with APEX Products

- ALUMINUM ALLOYS — *for all types of castings*
- ALUMINUM — *for steel deoxidizing and grain control*
- ALUMINUM BASE HARDENERS — *for alloying and grain refining purposes*
- GRAINED ALUMINUM — *for thermit reductions, steel metallurgy, chemical applications, etc.*
- ALUMINUM FLUXES — *for cleansing and grain refining all alloys*
- MAGNESIUM ALLOYS — *for all types of castings*
- MAGNESIUM ANODES — *for cathodic protection*
- ZINC ALLOYS — *for die castings and metal forming dies*

In the Apex laboratories, Apex research and facilities are devoted to producing *better* ingot, analyzing particular problems for foundries who use *all* methods of castings—sand, permanent mold or die casting. Thus, Apex maintains always this high standard: "Best in every test from Ingot to Casting!"

TECHNICAL SERVICES

Spectrographic standards . . . Chemical analytical methods . . . Physical and mechanical property tests . . . Chemical, quantometer and spectrographic analyses . . . Field engineering.

Research leadership back of every Ingot

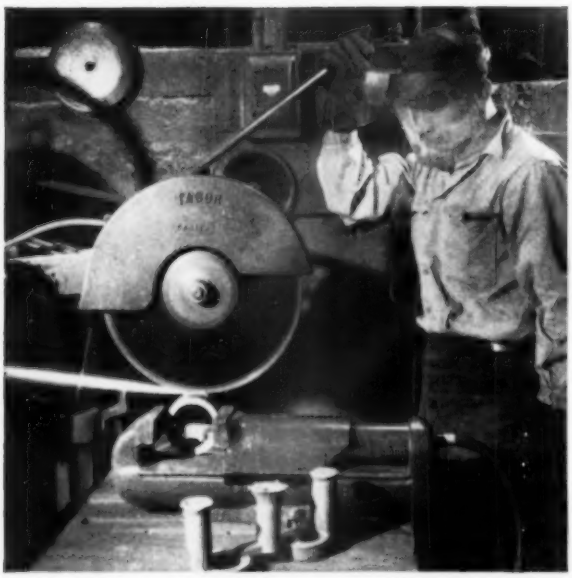
Apex Smelting Company

2537 WEST TAYLOR STREET • CHICAGO 12, ILLINOIS
6700 GRANT AVENUE • CLEVELAND 5, OHIO

Foundries Find MANHATTAN WHEELS Materially Lower Cutting Costs

For High Speed Grinding

Manhattan Abrasive Wheel Engineers have mastered the problems of fast cutting and long wheel life. They "Custom Manufacture" wheels for the particular metal alloy you are working. This becomes YOUR wheel formula and all subsequent orders are manufactured under laboratory controls to insure wheel efficiency consistent with the performance originally engineered for you. That is why many foundrymen claim Manhattan Snagging Wheels maintain the highest output per-man-hour on their swing frames, stands, and portable grinders.



For Cutting Gates and Risers

Manhattan Cut-Off Wheels are noted for their cool, quick cuts and long life on all types of metals. They remove gates and risers without burning or checking the metal. Because cuts can be made close to the casting, snagging is greatly reduced. Manhattan wheels are consistently showing high savings in foundries which keep records of speed of cut and number of cuts per wheel. Here again, it is the "Custom Manufacturing" of Manhattan Engineers that pays off on YOUR particular alloy.

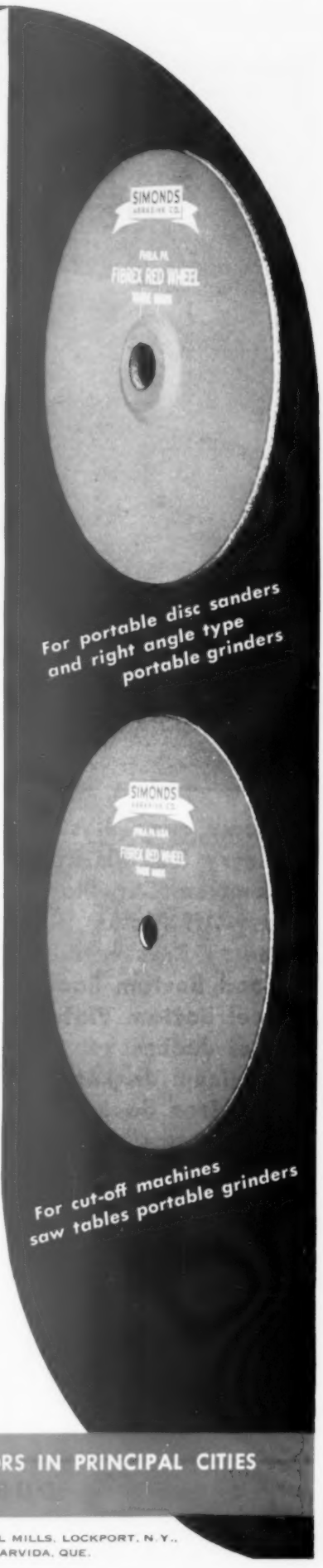
Don't hesitate to call a Manhattan Abrasive Wheel Engineer. He is qualified to help you with problems of cutting, grinding and finishing.

ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION

PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC., Manufacturers of Brake Linings • Brake Blocks • Clutch Facings • Radiator Hose • Fan Belts • Mechanical Rubber Products • Rubber Covered Equipment • Packings • Asbestos Textiles • Powdered Metal Products • Abrasive & Diamond Wheels • Bowling Balls


SIMONDS
FIBREX RED WHEEL
For portable disc sanders and right angle type portable grinders
SIMONDS
FIBREX RED WHEEL
For cut-off machines saw tables portable grinders

Faster

than grinding

SIMONDS ABRASIVE CO.

FIBREX® RED WHEELS

TRADE MARK

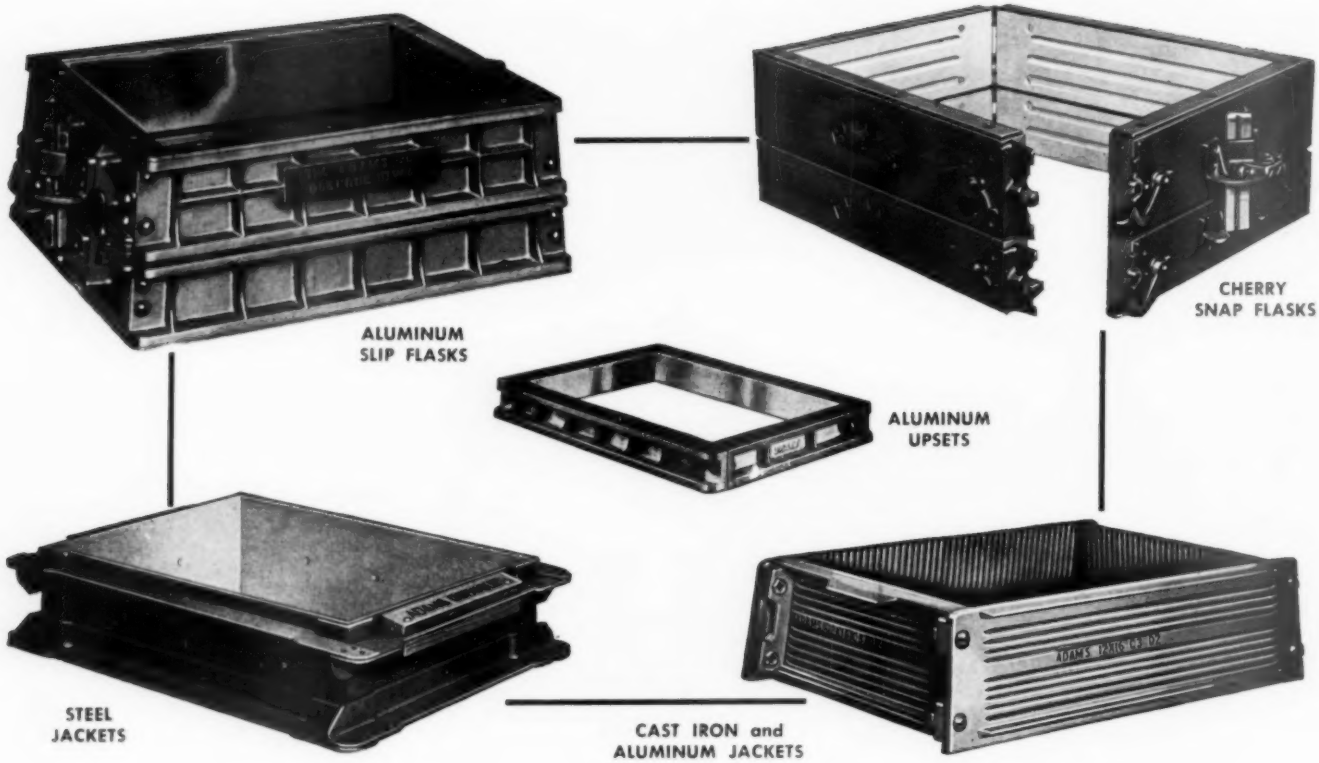
Where speed counts on the job, Fibrex Red Wheels are your answer. Tough — fast-cutting — durable — they head right into the work and actually *cut* away excess metal, faster by far than grinding it down. And, using the *same* Fibrex Red Wheel you can follow through immediately with your smoothing and finishing-up operations.

Try these sensational new abrasive tools. In straight wheels for cutting off brass, bronze, copper tubing and aluminum . . . depressed center wheels for cleaning up ragged surfaces and grinding welds especially on stainless steel. Send now for free Bulletin ESA 186.

SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA. DISTRIBUTORS IN PRINCIPAL CITIES

Member of Grinding Wheel Institute

DIVISION OF SIMONDS SAW AND STEEL CO., FITCHBURG, MASS. OTHER SIMONDS COMPANIES: SIMONDS STEEL MILLS, LOCKPORT, N. Y., SIMONDS CANADA SAW CO., LTD., MONTREAL, QUE. AND SIMONDS CANADA ABRASIVE CO., LTD., ARVIDA, QUE.



Precision Equipment for Precision Work

Cherry Snap Flasks
Cherry Slip Flasks
Aluminum Slip Flasks
Easy-Off Flasks
Cherry Presser Boards
Wood Bottom Boards
Steel Bottom Plates
Steel Jackets
Aluminum Jackets
Cast Iron Jackets
Steel Bands
Steel Upsets
Cherry Upsets
Aluminum Upsets

ADAMS
CUSTOM-BUILT FLASKS

PRECISION performance under all foundry conditions . . . that's what you get when you use Adams flasks! They insure accurate, uniform molds throughout years of hard usage because they are precision built to your exact specifications . . . give you better, faster production because they fit the specific requirements of your individual job . . . keep costs low by reducing rejects, minimizing finishing requirements. Adams flasks retain maximum rigidity and accuracy through years of service. Superior design and construction eliminate excess weight and make handling easy.

In today's increasingly competitive market, it's the precision product, made at lower cost, that brings in the profit dollar. For full information on Adams complete line of flasks and flask equipment, write THE ADAMS COMPANY, 700 Foster Street, Dubuque, Iowa.

The ADAMS Company

ESTABLISHED 1883

DUBUQUE, IOWA, U.S.A.

MOLDING MACHINES and FLASK EQUIPMENT

SLASHES CORE COSTS!

Cuts Core Making Time from Days to Minutes

HERE'S A REVOLUTIONARY new way of making cores in one step. It replaces the time consuming steps of the conventional core making process shown in the drawing above. Cores can now be dried in minutes instead of hours . . . and cooling, curing and storage are not needed. It means savings of time, space and labor.

Instead of placing cores on collecting racks, core maker places them directly onto moving conveyor belt of *Foundromatic* Sand Core Dryer. *One step eliminated!* Cores come out of dryer a few minutes later cool enough to be handled with bare hands, and can go directly to the molder. *Two more steps eliminated.* Cuts out cooling rack, and storage rack. Reduces handling, breakage and floor space.

In addition, you'll enjoy speed and cleanliness. It takes up to 80% less time to dry cores — and they all come out perfect — without overbaking. Burning of fins or thin sections is eliminated! Working conditions improved too. Fumes and heat are gone from the core room. And in addition, you'll save 30 to 60% on fuel.

For complete information, outline your requirements to your nearby A-C Sales Office, or send in the coupon.

Foundromatic is an Allis-Chalmers trademark.

ALLIS-CHALMERS

ALLIS-CHALMERS, 1032A SO. 70 ST.
MILWAUKEE, WIS.

Please send me information on the *Foundromatic* Sand Core Dryer.

Name.....

Title.....

Company.....

Street.....

City..... State.....

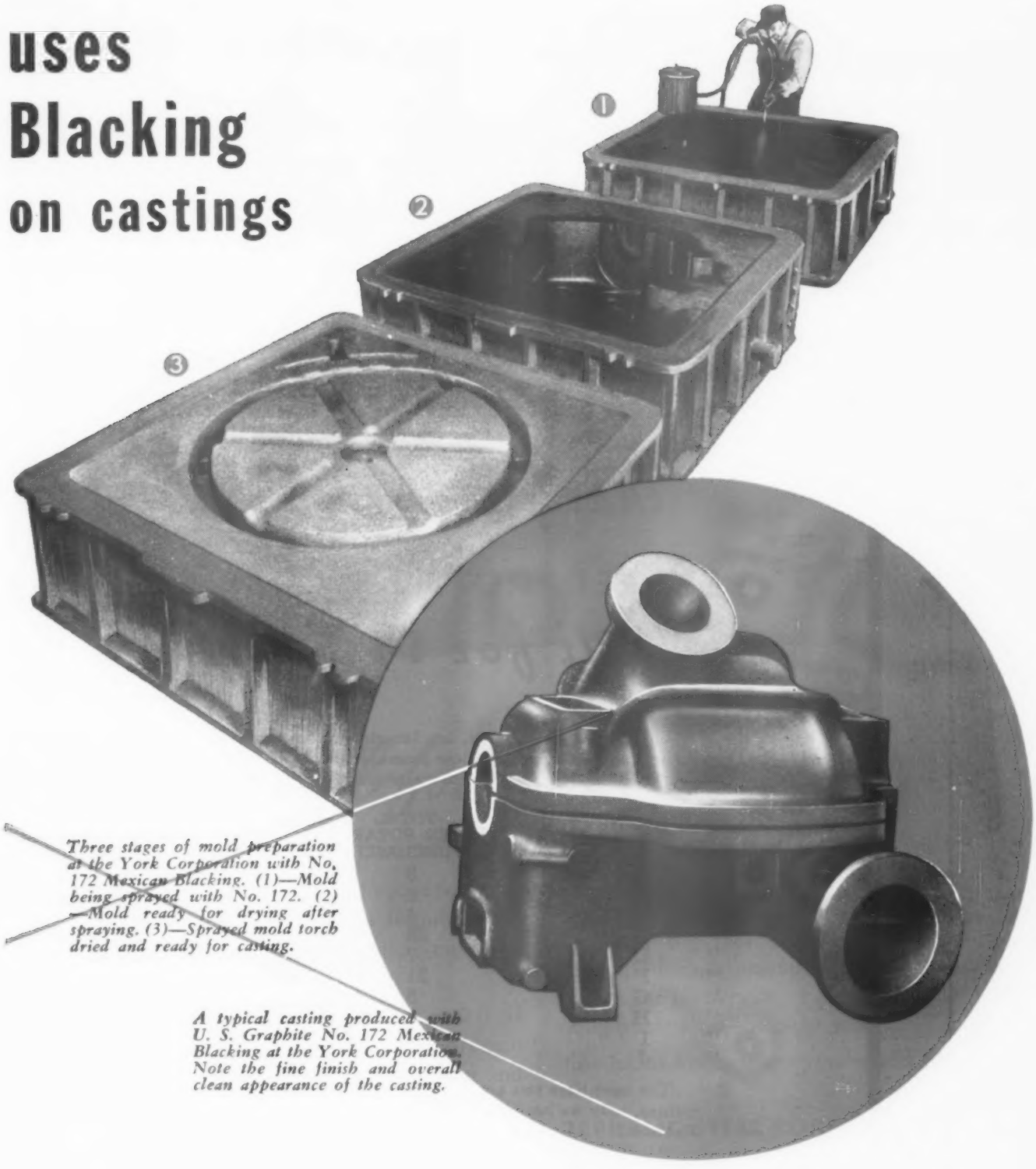
A-3085

York Corporation
No. 172 Mexican
for finer finish

The York Corporation, manufacturer of refrigeration and air conditioning units, and operator of large iron foundries, is a regular user of No. 172 Mexican Blacking to produce castings with a *better finish and reduce foundry production costs.* No. 172 is a high quality wet blacking, containing a binder, that can easily be applied to cores and dry sand molds with spray, brush, or swab. It permits the sand to peel freely, leaving a smooth-surfaced casting *that requires minimum cleaning.* No. 172 Mexican Blacking is recommended for medium, extra large and pressure castings weighing 1 to 25 tons. No. 172 is also an excellent core coating. Only water is required to prepare for use. Other Mexican Graphite products include Cordip —for dipping or spraying dry or green sand cores— and Mexacote—for cores and molds in light and medium production casting where extra resistance to high temperature metal is demanded.

THE UNITED STATES GRAPHITE COMPANY

uses Blacking on castings



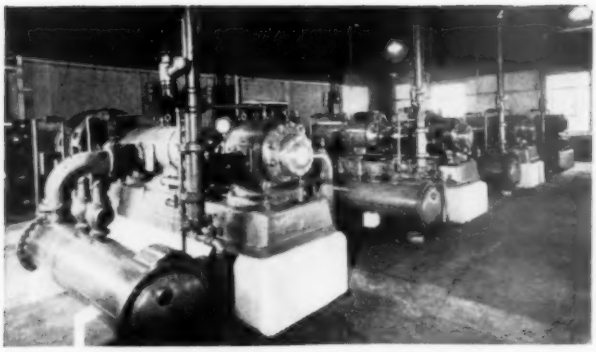
Three stages of mold preparation at the York Corporation with No. 172 Mexican Blacking. (1)—Mold being sprayed with No. 172. (2)—Mold ready for drying after spraying. (3)—Sprayed mold torch dried and ready for casting.

A typical casting produced with U. S. Graphite No. 172 Mexican Blacking at the York Corporation. Note the fine finish and overall clean appearance of the casting.

No. 172 Mexican Blacking

DIVISION OF THE WICKES CORPORATION • SAGINAW, MICHIGAN

FULLER ROTARY COMPRESSORS



Four Fuller Rotary Two-stage Compressors installed in a steel mill. Capacity each, 1665 c.f.m., 100-lb. pressure.

Facts

that prove our case!

• • • FULLER ROTARY COMPRESSORS *are built for* 100-125-LB. PRESSURE

Many users of compressed air, we find, are laboring under the false impression that Fuller Rotary Compressors are built only for low-pressure operation. To refute this impression, we list below, only a few cases in the steel industry, which show installations of two-stage machines, operating at high pressures.

	TOTAL FULLER ROTARIES PURCHASED	FOR HIGH-PRESSURE OPERATION
Company A	8	6
" B	6	5
" C	4	4
" D	28	23
" E	7	6
" F	21	21
" G	5	5
" H	4	4
" I	17	11
" J	19	18

The next time you are in the market for compressors, or vacuum pumps, may we have the opportunity to tell you more about Fuller Rotaries?

FULLER COMPANY

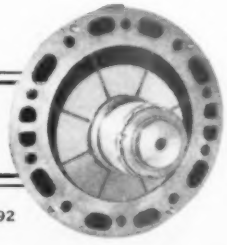
CATASAUQUA—PENNSYLVANIA

Chicago 3 - 120 So. LaSalle St.

San Francisco 4 - 420 Chancery Bldg.

No. 2 of a series

A LIFETIME OF NEW MACHINE EFFICIENCY



C-192

FOUNDRY PROBLEMS?

Time to call for the . . .

Whatever the problems in your foundry, it's a good bet that the Republic Pig Iron Metallurgist can help you solve them—*in a hurry!*

His qualifications: years of practical foundry experience . . . a thorough knowledge of all types of pig iron and their characteristics . . . a natural ability to analyze and weigh end results before making a recommendation.

Large and small foundries alike make it a point to keep in touch with the Republic Pig Iron Metallurgist. Why not follow their example? There's no charge for his service . . . and the only obligation is his—*to help you!*

Just let us know when you would like him to call.

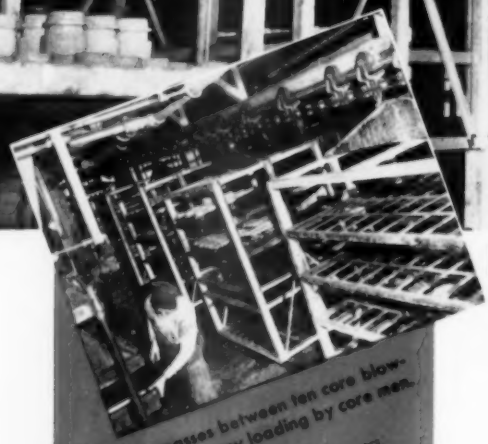
REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

Republic PIG IRON

"CHATEAUGAY"	"REPUBLIC"	"PIONEER"
Low-Phosphorus, Copper-Free	(Northern) Foundry, Basic and Malleable	(Southern) Foundry and Basic

REPUBLIC STEEL

ALSO TRUSCON FOUNDRY FLASKS • REPUBLIC CORE WIRE • FOUNDRY NAILS


Conveyor passes between ten core blowing stations for easy loading by core men.

Emerging from oven, racks pass along cooling zone returning to main floor for unloading.

With cores sufficiently cooled, unloading begins as soon as racks reach main floor.

DESPATCH OVERHEAD CORE OVEN

Makes Every Square Foot of Floor Space Available to Core Handling!

A little over a year ago the J. I. Case Co. of Rock Island, Ill. built a 110′ x 60′ addition to their foundry to house a modern conveyorized core room. DESPATCH Engineers collaborating with Case Foundrymen, designed, built and installed a core room system that, in the words of Stanley Olson, Foundry superintendent, "has effected savings of over 25% in core handling; has reduced core breakage and rejects by more than 25%; has raised core quality 50% and has brought about 100% better working conditions."

DESPATCH features include a 3-pass, convection heated oven of overhead construction, making available every square foot of floor space underneath for core handling. Overhead oven also provides a bottom entrance for the 392-ft. continuous conveyor, providing a natural heat seal. Direct gas fired air heater supplies the heat and hi-volume fans provide rapid heat transfer. After leaving the oven, cores pass through an open cooling zone and are returned to floor level for unloading. The effective oven ventilation system eliminates core gas in the core room.

The Case Foundry uses 50 tons of sand per 8-hour day and produces miscellaneous tractor and implement cores. Sand is supplied to the ten core blowing stations by a unique overhead supply system, eliminating the shovel and wheelbarrow method.

You Too, Can Achieve Faster, Easier, More Economical Core Baking with a DESPATCH ENGINEERED INSTALLATION!

DESPATCH Core Ovens are specially designed to increase production through better baking efficiency. With direct gas or oil fired heaters and special Despatch convection heating, fuel costs are drastically cut. Trouble-free operation cuts maintenance to a minimum. Equipped with automatic temperature controls and fire underwriters' approved safety system, you can depend on DESPATCH ovens for safe, unexcelled performance.

WRITE TODAY for Bulletin 31J or request a representative to call

MINNEAPOLIS OFFICE:
619 S. E. Eighth Street

CHICAGO OFFICE:
7070 N. Clark Street

DESPATCH OVEN COMPANY

did you see 'em work at the show?

● More and more, foundrymen are realizing that there is no money in shoveling sand by hand. The best way to handle sand is, NOT TO HANDLE IT.

AJAX

LO-VEYORS

are self-contained, vibrating conveyors ready to set in place and use. They occupy little head room and are easily installed on the floor, below the floor or suspended from ceiling or walls.

The Ajax reciprocating drive unit is completely enclosed and operates in oil. There are no exposed idler rolls and bearings subject to rapid wear by abrasive sand.

Write for information on how they are used in foundries for handling sand and small castings.

AJAX FLEXIBLE COUPLING CO. INC.

204 ENGLISH STREET

WESTFIELD, NEW YORK

Leading

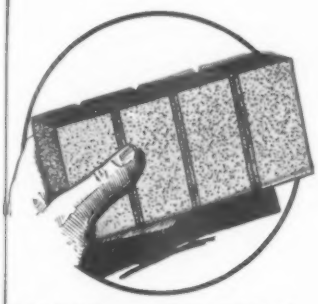
Famous

CORNELL MOLTEN METAL **FLUX**

..has "batted in" savings of thousands of dollars previously "left on base" by casting rejects.

"Batting" Average Since 1918

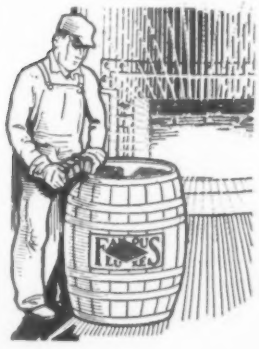
● **For over 32 years, Famous Cornell Flux has been voted the most valuable contribution to *better castings* and *reduced rejects*, by leading foundries, coast to coast.**



SCORED BRICK FORM

This pre-measured form eliminates picking out of container, weighing and measuring.

You simply toss Famous Cornell Iron Cupola Flux into cupola with each ton charge of iron, or break off one to three briquettes (quarter sections) as per instructions. This solid form insures fullest efficency because there is no loss up the stack by force of blast.



Famous CORNELL CUPOLA FLUX in SCORED BRICK FORM

Here's the pay-off for adding a little Famous Cornell Cupola Flux to each charge of iron:

- Clean, Hotter and freer flowing iron.
- Big reduction of sulphur, more fluid slag.
- Castings are sounder, tougher, cleaner.
- Hard spots, hollow centers, chilled sides, etc. are reduced amazingly, which facilitates smoother production in the machine shop.
- Cupola Maintenance is greatly reduced. Drops are cleaner, there is less bridging over, and the glazed or vitrified surface, which Famous Cornell Cupola Flux forms on cupola lining, reduces erosion of brick or stone, thereby prolonging the periods between patching or replacement.
- And the cost of using Famous Cornell Cupola Flux is LOW—only a fraction of a cent per average size casting and labor cost is practically nil.

• • •

MALLEABLE FOUNDRIES, TOO, with cupola operation, are turning to Famous Cornell Cupola Flux to give their castings a better start.

Write for Bulletin No. 46-B

Famous CORNELL ALUMINUM FLUX

CLEANSES MOLTEN ALUMINUM so that you pour clean tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections can be poured. Castings take a higher polish. Exclusive formula greatly reduces obnoxious gases, improves working conditions. Dross contains no metal after this flux is used.

Famous CORNELL BRASS FLUX

CLEANSES MOLTEN BRASS even when dirtiest brass turnings or sweepings are used. You pour clean, strong castings which withstand high pressure tests and take a beautiful finish. The use of this flux saves you considerable tin and other metals, and keeps crucible and furnace linings cleaner, adds to lining life and reduces maintenance.

The CLEVELAND FLUX *Company*

1026-1040 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

FAMOUS CORNELL FLUXES
Trade Mark Registered

LOOKING FOR WAYS TO CUT HEAT-TREATING COSTS? . . . TRY FIGURING WEIGHT OF EQUIPMENT AGAINST APPLIED LOAD
BOX WEIGHT
LOAD WEIGHT
Cast Alloy Box
BOX WEIGHT
LOAD WEIGHT
Welded Alloy Box

PSC's *Higher Ratio* CAN LOWER YOUR COSTS 3 WAYS

In many installations the above PSC annealing boxes have tripled the weight ratio of load and box. For example, in one recent installation the cast boxes which were replaced weighed as much as the 300-lb. load; a ratio of 1:1. The PSC sheet-welded boxes, carrying the same load, weighed 2/3 less; ratio 3:1. A study made by one customer showed that, due to this higher ratio, the saving in fuel needed to heat the metal itself of the old boxes was $40 a furnace cycle. Another installation showed that the saving in heat-up and handling time shortened the cycle as much as 5 hours. Let us show you how PSC light-weight, welded alloy equipment can save you fuel, as well as handling and treating time.

Light-Weight **Heat-Treating Equipment for Every Purpose**

Carburizing and Annealing Boxes
Baskets • Trays • Fixtures
Muffles • Retorts • Racks
Annealing Covers and Tubes
Pickling Equipment
Tumbling Barrels • Tanks
Cyanide and Lead Pots
Thermocouple Protection Tubes
Radiant Furnace Tubes and Parts
Heat, Corrosion Resistant Tubing

We furnish standard or special welded alloy equipment in any size, and in any metal to meet your heat and corrosion requirements. Send blue prints or write as to your needs.

THE PRESSED STEEL COMPANY
of WILKES-BARRE, PENNSYLVANIA

Industrial Equipment of Heat and Corrosion Resistant WEIGHT-SAVING *Sheet Alloys*

☆ ☆ ☆ OFFICES IN PRINCIPAL CITIES ☆ ☆ ☆

WHEELABRATOR® Tumblast reduces cleaning costs 67%

COST COMPARISON CHART

	FORMER method	WHEELABRATOR method
MACHINE	Wet blast tumbling mill	27" x 36" Wheelabrator Tumblast
PRODUCTION	550 tons annually	550 tons annually
LABOR REQUIREMENTS	12 man hrs. daily	5 man hours daily
COSTS PER TON	$10.52½	$3.46½

KEYSTONE Brass Works, Inc.
Erie, Pennsylvania
SAVES $3,883 in one year

SAVINGS	Per Ton	Daily	Annually
	$7.06	$15.53	$3,883

By installing a 27"x36" Wheelabrator Tumblast the Keystone Brass Works, Inc. cut cleaning costs 67% and saved enough to pay for the installation in approximately one year's time.

The Wheelabrator replaced a wet blast mill formerly used for all cleaning operations. It quickly put an end to Keystone Brass Works' cleaning problems — poor cleaning quality, costly and slow operations, messy working conditions and constant jam-up of castings in the cleaning department.

Impressive savings were also effected in tool grinding and tool repairs in their machine shop as a result of the complete removal of sand from the castings.

Is your cleaning equipment robbing you of hard-earned profits? Ask Wheelabrator engineers to show you how to put your cleaning department on a paying basis. Write for full information today.

American WHEELABRATOR & EQUIPMENT CORP.
WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT
505 S. BYRKIT ST. MISHAWAKA 2, INDIANA

PLEASE TURN PAGE

AT LAST!

. . . . . the ANSWER to FAST

As creators of the first sand conditioning machine ever built . . . the Sandcutter . . . AMERICAN is proud of this important new contribution to the foundry industry. Back of it are 43 years' experience in engineering and building rugged, cost-cutting sand conditioning equipment.

Compare the Sandmaster point-by-point and you will agree that it . . . and it alone . . . incorporates all the design and operating features necessary for fast, complete sand conditioning. Write for Bulletin No. 45.

The NEW *American*

SANDMASTER

A better machine for better sand

BETTER SAND QUALITY

The improved cutting cylinder of the new Sandmaster differs from the conventional Sandcutter in that it imparts a mulling action to the Sand, giving it a superior quality. This feature also permits the conditioning of synthetic sand quickly and with less bond additions.

The action of the Sandmaster in mixing sand and water is most thorough . . . it is never spotty . . . water and new sand are uniformly blended in with the old.

The tempered sand, free from all steam and gases, falls through the screen in ridged windrow formation . . . aerated, fluffy and cool . . . in perfect condition for molding.

A distinct advantage of the new Sandmaster is the fact that sand can be recut any number of times in either direction until proper temper is obtained.

MAGNETIC SEPARATION

A high efficiency magnetic separator effectively removes the largest and smallest sizes of shot and tramp iron from the sand before it is screened.

SCREENING

Particles of coke, charcoal, cores, gaggers, core rods, etc., usually present in any sand heap, are effectively removed. By screening out these impurities, the percentage of gas blows, scabs, rough castings and broken molds is greatly reduced. After screening the molding sand is in such condition that the use of facing sand is materially reduced. Screening also opens up, fluffs, aerates and cools the hot sands, permitting the gases to escape.

PILING

After conditioning the entire heap can be piled beside the molding machine or between benches. The action of the Sandmaster in piling really gives the sand additional cutting, aeration, and cooling due to the extra forward and backward movement of the cutting cylinder through the heap. Sand piles are neatly trimmed and shaped.

VARIABLE SPEEDS

The machine is self-propelled — powered by either gas or electric drive. Its speed can be varied and regulated according to the type of sand, it's moisture content, and its general condition as follows: For cutting and screening — 4 ft. to 25 ft. per minute. For piling and traveling from floor to floor — 25 ft. or 100 ft. per minute.

The machine can be equipped with wheels fitted with either pneumatic tires, solid rubber tires, or steel tires with replaceable treads to suit the condition of the foundry floor.

EASILY MANEUVERED and CONTROLLED

The machine is designed for fast action and extreme maneuverability. The will of the operator is instantly translated into action without fatigue on his part. Steering and the raising and lowering of the cutting cylinder are hydraulically controlled. The single direct motor drive provides fast operation and facilitates handling.

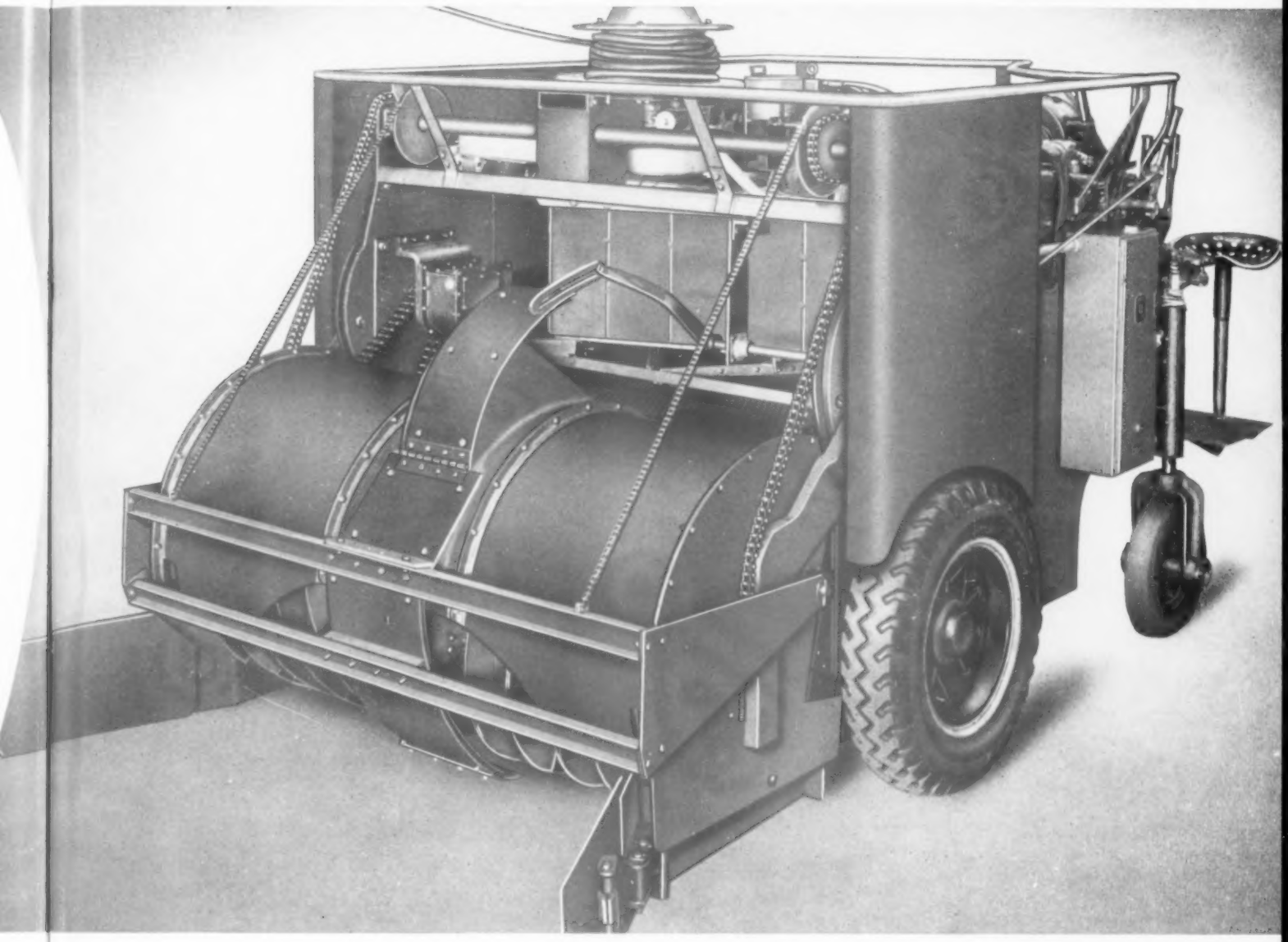
PLEASE TURN PAGE

MANUFACTURING LICENSEES for Continental Europe: George Fischer, Ltd., Schaffhausen, Switzerland; for British Empire, excluding Canada: Tilghman's Patent Sand Blast Co., Ltd., Broadheath, Nr. Manchester, England. SALES REPRESENTATIVES: Brazil — Equipamentos Industriais "Eisa" Ltda.; Argentina — Clarfix S. R. L.; Mexico — Cassa, S. De. R. L.; Puerto Rico — Angel Cabiella.

American

SAND CONDITIONING HE

COMPLETE Sand Conditioning



. . . gives sand the "Velvet Feel" your molders will appreciate

- Operations: (1) Cutting (2) Magnetic Separation (3) Screening (4) Piling
- Self Propelled: gas or electric drive
- Variable Speeds:
  - — Cutting and Screening . . . 4′ to 25′ per minute
  - — Piling or Traveling from floor to floor . . . 25′ or 100′ per minute
- Easily Maneuvered
- Hydraulic Steering
- Mulling action provides better sand
- Permits recutting until proper temper is obtained
- Complete aeration and cooling
- Conditions synthetic sands quickly and with less bond additions.

THE AMERICAN MOLDER

WHEELABRATOR & EQUIPMENT CORP., 505 S. Byrkit St., Mishawaka 2, Ind.

HEADQUARTERS FOR 43 YEARS

PLEASE TURN PAGE

DUSTUBE design SAVES maintenance time

Costly, time-consuming production stoppages for dust filter inspection and replacement are eliminated by the simple design of a Dustube Collector. Infrequent filter tube replacements take only a few seconds . . . the tube is hung on a hook attached to the shaker channel overhead and the retaining ring is snapped into place in the cell plate above the dust hopper . . . that's all. Only one man is needed to install the tubes and he needs no tools.

Dustube efficiency will eliminate your dust hazard and Dustube's operating economy will save you money. Write today for full information.

SEE HOW IT SAVES for Indiana Brass Co. Inc., Frankfort, Indiana

MR. L. COX, *Foundry Superintendent*

"Based upon our successful experience, we are convinced that the Dustube Dust Collector exceeds in every way the four requirements for an adequate dust control system: simplicity, compactness, high collecting efficiency plus low operating cost. The trouble-free operation of the unit almost enables us to forget it but we can't overlook the complete absence of dust in our cleaning department."

MR. A. C. ELLIOTT, *Maintenance Foreman*

"The simplicity of the Dustube design appeals to our crew. Only one man is needed for servicing and maintenance. Any necessary work or regular inspection is done on the clean air side of the collector and we especially like the ease and short time required to replace a tube, although this is done very infrequently. We have found that this simplicity in no way impairs the ruggedness needed for heavy service in our foundry."

TRU-STEEL SHOT* *lasts 43% longer than chilled iron*

For Railroad Car Wheel Manufacturer

In a seven month's comparative test between TRU-STEEL and Chilled Iron abrasive in cleaning chilled car wheels in a Wheelabrator Cabinet, a Midwestern foundry found that 11.48 wheels could be cleaned per pound of TRU-STEEL Shot, compared with only 2.16 wheels per pound of Chilled Iron Shot. As a result, the use of TRU-STEEL effected important savings in the cost of abrasive per wheel, and at the same time materially reduced maintenance costs on the blast equipment.

If you have not already acquainted yourself with the profit-making advantages of TRU-STEEL Shot we urge you to get the facts without delay. Write for descriptive bulletin No. 59.

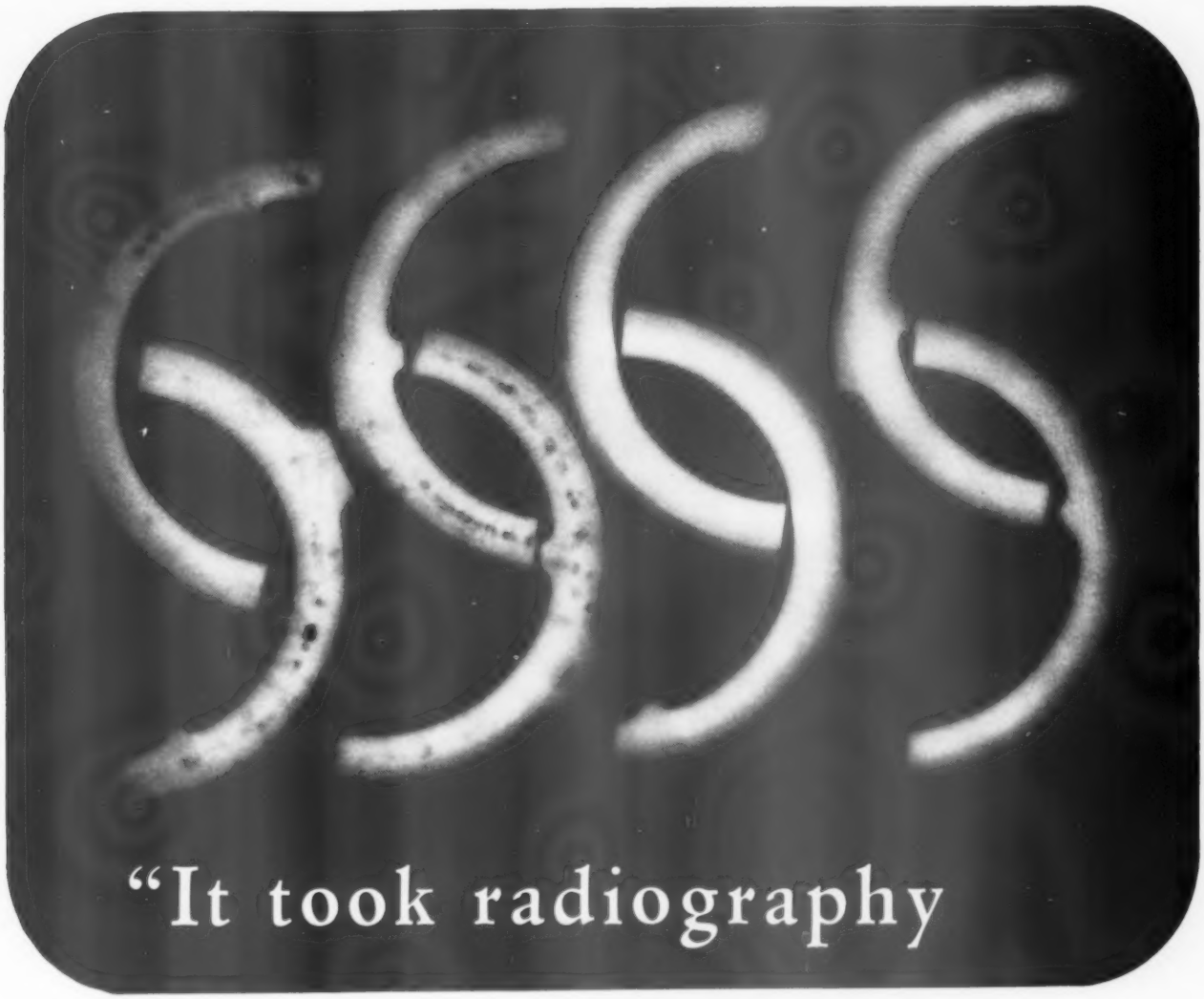
*Tru-Steel Shot is manufactured by Steel Shot Producers, Inc., Butler, Pa.

TRU-STEEL
No. 230 at Mag. 10X
After 1,500 Passes

CHILLED IRON
No. 230 at Mag. 10X
After 50 Passes

PLEASE TURN PAGE

American **WHEELABRATOR & EQUIPMENT CORP.**
505 S. Byrkit St., Mishawaka 2, Indiana



"It took radiography to find the leak..."

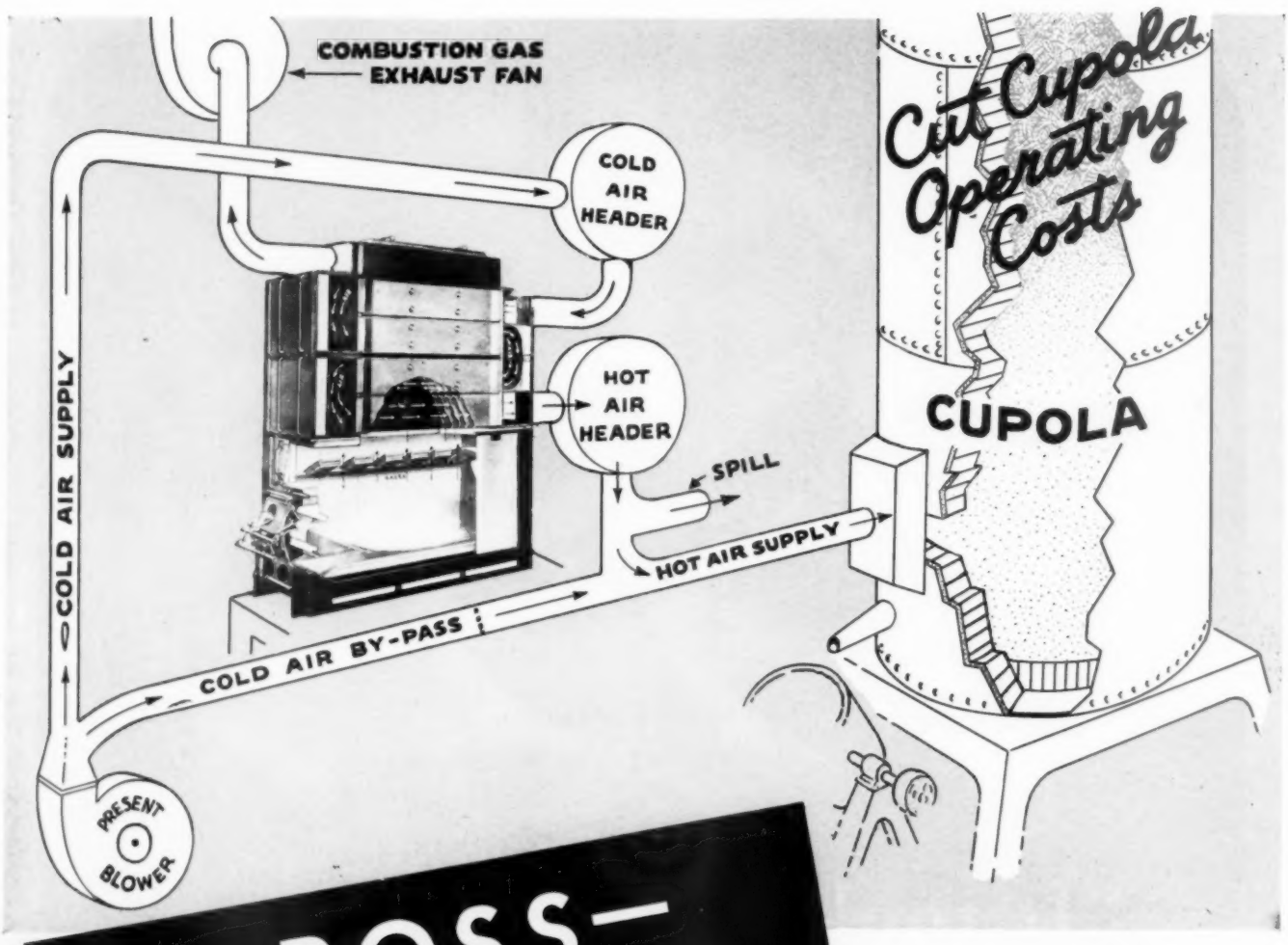
SO writes the inspection manager of one of the nation's leading manufacturers of valves and fittings. "We had a problem of porous valve seat ring castings showing up at the final test of valves," the inspection manager continued. "With the aid of our x-ray apparatus, defective castings were found to be porous and gassy, causing the leaks through the ring.

"After a thorough research, it was found the foundry technique required some changes, resulting in sound castings as shown on right of radiograph. A saving was effected in eliminating the machining, assembling and disassembling of unsound rings."

This company's experience is typical of scores of others who have found that radiography has become a *development* tool. It not only diagnoses, but suggests treatment. It shows where savings can be made, designs improved, new techniques developed.

Is there a place for industrial x-ray in your business? A General Electric X-Ray engineer will be glad to talk it over. Or write for Pub. 11A-3116 "Radiography as a Foundry Tool." Address General Electric X-Ray Corporation, Dept. YY6, Milwaukee 14, Wisconsin.

GENERAL ELECTRIC
X-RAY CORPORATION



—ROSS— HOT BLAST SYSTEM

As shown by the simplified diagram, ROSS Air Heaters, fueled with oil or gas or both, are located between your existing blower and cupola. Heat from the fuel burned is directly transmitted to the cold air passing through by means of an efficient heat exchanger, raising the temperature of the air to 450 deg. F. for delivery to cupola. The system is designed for your particular operating conditions and can be installed without any interruption to your melting schedule. Get full particulars on this simple, effective system that soon pays for itself out of savings secured.

ADVANTAGES FROM ITS OPERATION

- Saves approximately 25% of coke.
- Eliminates bridging.
- Increases melting temperature.
- Reduces amount of slag.
- Cuts manganese and silicon oxidation.
- Reduces "pigging" from cold metal.
- Assures finer grain castings.
- Permits faster morning starting.
- Effects sizable savings in labor and materials in cleaning, patching, etc.

ROSS SYSTEMS

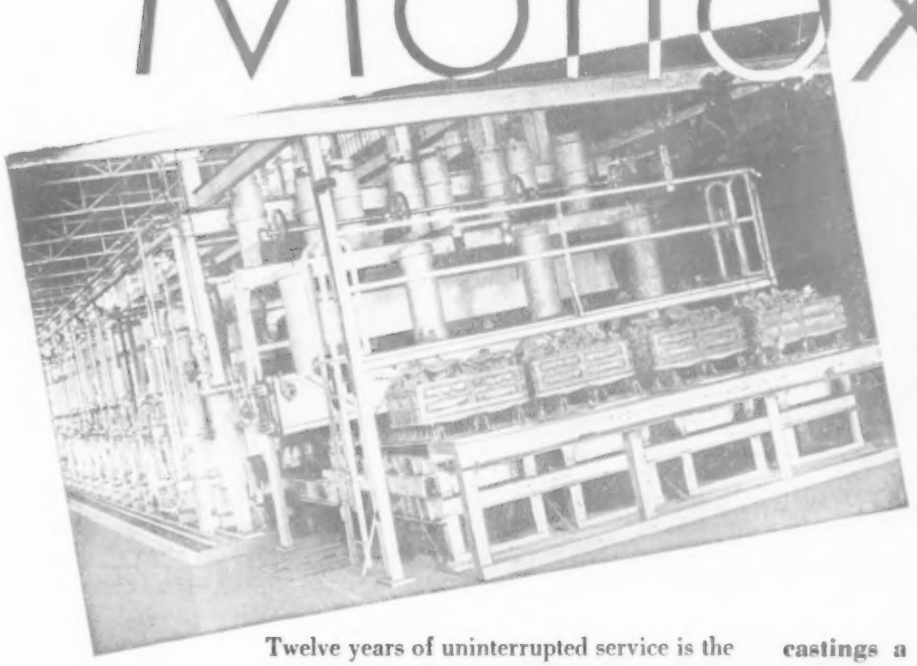
J. O. ROSS ENGINEERING CORPORATION

MANUFACTURERS OF AIR PROCESSING SYSTEMS

350 MADISON AVENUE NEW YORK 17, N. Y.

201 N. Wells Street, CHICAGO-6 • 79 Milk Street, BOSTON-9 • 9225 Grand River Avenue, DETROIT-4 • 600 St. Paul Avenue, LOS ANGELES-17
ROSS ENGINEERING OF CANADA, LIMITED, MONTREAL 19, CANADA • CARRIER-ROSS ENGINEERING COMPANY, LIMITED, LONDON, ENGLAND

Carbon Monoxide



NO MENACE TO B&W REFRACTORIES

Twelve years of uninterrupted service is the record established by B&W Refractories in a continuous malleableizing furnace operating under high CO atmosphere.

Refractories previously used in furnaces of this type disintegrated rapidly due to the reaction between the prepared atmosphere and impurities in the brick. But with B&W Refractories, brickwork maintenance has been negligible.

Today, this furnace and five similar furnaces in the same plant—all equipped with B&W IFB linings and B&W 80 Firebrick piers —**are malleableizing 450 tons of castings a day without interruption!**

Equally important, the use of B&W Insulating Firebrick has helped to reduce cycle time from 72 hours—required in old type furnaces lined with heavy firebrick—to 30 hours. Significant fuel savings, and improved product quality through closer temperature control have also been achieved.

If you are looking for ways to increase your production and decrease your costs, the use of B&W Refractories in your furnaces will prove of assistance. Your local B&W Refractories Engineer will be pleased to discuss your problems with you.

R-324

B&W REFRACTORIES PRODUCTS

B&W 80 FIREBRICK • B&W JUNIOR FIREBRICK
B&W 80 GLASS TANK BLOCKS • B&W INSULATING FIREBRICK
B&W REFRACTORY CASTABLES, PLASTICS AND MORTARS

•

OTHER B&W PRODUCTS

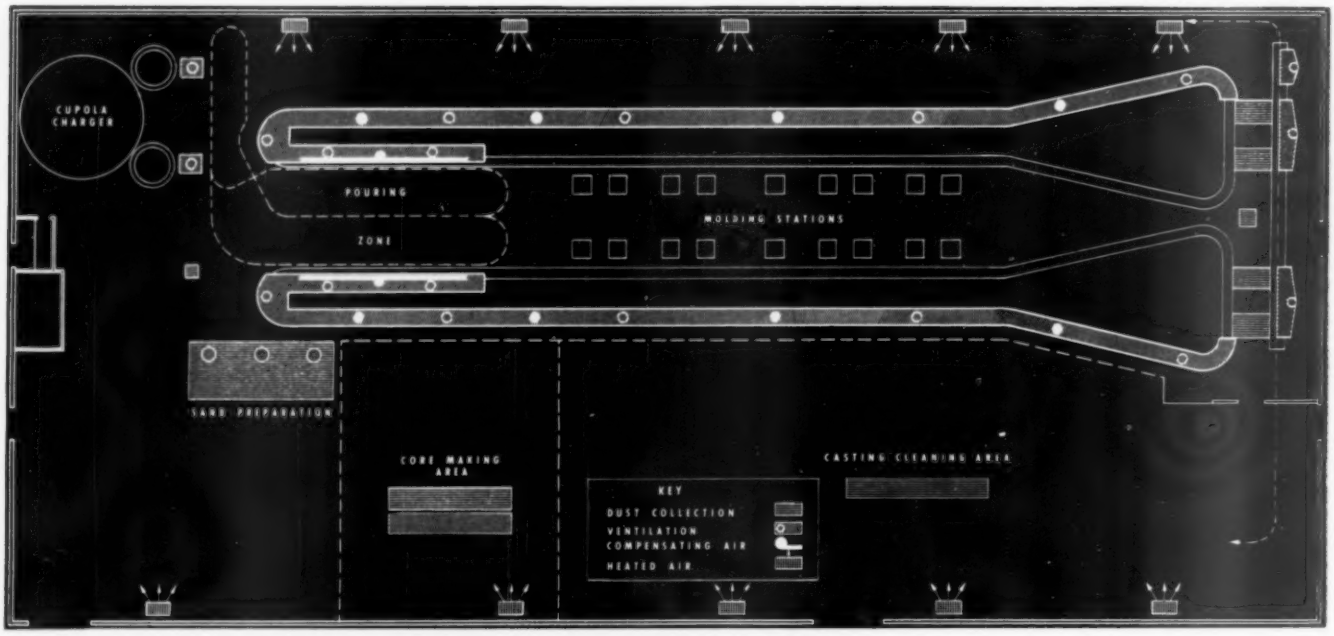
Stationary & Marine Boilers and Component Equipment
Chemical Recovery Units . . . Seamless & Welded Tubes . . . Pulverizers
Fuel Burning Equipment . . . Pressure Vessels . . . Alloy Castings

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 85 LIBERTY ST., NEW YORK 6, N.Y.
WORKS: AUGUSTA, GA.

A bvb Solution by Schneible

ACTUAL PLANT LAYOUT OF BUILDING VENTILATION BALANCE



BUILDING VENTILATION BALANCE
(An Actual BVB Installation)

DEPARTMENTS	EXHAUST		SUPPLY		% of Total Air Saved
	Dust Collector	Ventilation	Heated	Compensating	
MOLD UNITS					
Pouring		90,000 cfm		62,000 cfm	68%
Mold Conveyor		120,000		88,000	73%
Shakeout	40,000 cfm				
Casting Conveyor Load		8,000			
Sand Handling and Preparation	21,000	5,000			
Other		25,000			
CLEANING ROOM					
Abrasive Cleaning	7,500				
Tumbling	4,500				
Grinding	10,000				
Casting Sorting (Hot)		11,000			
CORE ROOM					
Mixers	2,500				
Ovens		9,200			
Other		2,400			
MELT DEPARTMENT					
Cupola Spout and Ladle		10,000			
Charging Door (Losses)		20,000			
Cupola Blower		8,000			
Other		5,000			
GENERAL					
Heated Air Supply			264,100		
Miscellaneous Losses		40,000			
Miscellaneous Sources				25,000	
TOTALS	85,500 cfm	353,600 cfm	264,100	175,000 cfm	49%

SAVINGS ARE HERE AS AIR IS NOT HEATED

TOTAL EXHAUST 439,100 – bvb
TOTAL SUPPLY 439,100 –

The *b v b* layout above was developed by Schneible engineers for a large Eastern foundry.

All hoods were located for maximum efficiency in ventilation and dust control. Unit heaters in outside walls furnish right amount of heated air which when combined with the compensating air equals the total air exhausted through dust collectors and ventilation.

This is b v b *or building ventilation balance and* b v b *allows the same efficient operation of dust and ventilation equipment in both Winter and Summer.*

b v b gives greater economy in the operation of power plant facilities and dust collector capacity in winter, and cleaner, cooler working conditions in summer.

Check your own *b v b*—if you don't find *building ventilation balance*, Schneible engineers can save you money!

PRODUCTS: Multi-Wash Collectors • Uni-Flo Standard Hoods Uni-Flo Compensating Hoods • Uni-Flo Fractionating Hoods Water Curtain Cupola Collectors • Ductwork • Velocitrap Dust Separators • Entrainment Separators • Settling and Dewatering Tanks • "Wear Proof" Centrifugal Slurry Pumps

CLAUDE B. SCHNEIBLE COMPANY • P. O. BOX 502 • DETROIT 32, MICHIGAN

SCHNEIBLE

FOUNDRY EQUIPMENT MEMBER FEMA MANUFACTURERS ASSOCIATION INC.

$125 and 7 weeks saved, thanks to NI-ROD repair of cast iron speed reducer

When a mishap all but destroyed a vital coil-vat speed reducer, maintenance men of the M & R Dietetic Laboratories were faced with a serious problem.

A new speed reducer cost 135 dollars and would take 8 weeks to be delivered. Repairing the unit would require only a week, but the damage was so extensive that success seemed doubtful. Yet, there was so much to be gained that they decided to take the gamble.

The shattered speed reducer was sent to M & R's welding shop, where . . . using Ni-Rod® electrodes . . . their welding technicians succeeded in assembling the broken pieces.

The cost of the repair, including labor, was only 10 dollars, and the time required was 1 week. *This represented a net saving of 125 dollars and 7 weeks down time. A highly profitable operation, indeed!*

Experiences such as this . . . of time and money saved in welding cast iron with Ni-Rod electrodes . . . are daily occurrences at thousands of welding shops throughout the nation. The reason for Ni-Rod's popularity with these experienced welders is *dependability.* With Ni-Rod electrodes you get quick, sound, machinable welds in all grades of cast iron . . . usually without preheating or postheating. Ni-Rod works well in all positions; can be used with either AC or DC current.

The best way to find out about Ni-Rod's many advantages is to try it. Order a package today and discover for yourself why *4 out of 5 shops* re-order Ni-Rod, once they have tried it.

Your nearest INCO distributor stocks Ni-Rod in 3/32", 1/8", 5/32", and 3/16" diameters.

Coil-vat speed reducer repaired with Ni-Rod at M & R Dietetic Laboratories, Columbus, Ohio.

For welds you've never been able to make before . . . in high-phosphorous irons; heavy sections—

NI-ROD "55"

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

AIR POWER
Key To Lower Production Costs

Send for Form 5010A, containing over 30 pages of remarkable time and money savings made with Air Tools.

AIR TOOLS
COMPRESSORS
ROCK DRILLS
TURBO BLOWERS
CONDENSERS
CENTRIFUGAL PUMPS
OIL & GAS ENGINES

Manpower turns out more work in less time when provided with dependable, light weight Ingersoll-Rand Air Tools. Air Tools help men to do the job faster, with less fatigue, with more accuracy and with greater uniformity.

Rugged and compact in construction, non-fatiguing and dependable in operation, I-R Air Tools are ideal for increasing production without increasing production costs. Under today's conditions these tools pay for themselves nearly twice as fast.

Call, wire, or write your Ingersoll-Rand branch office today and have an I-R Air Tool Specialist visit your plant — put his years of experience in varied fields to work for *you.*

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.

404-8

Longer Nozzle Life *Every* Time

IF YOU are looking for a way to increase nozzle life in your blast cleaning department—if you wish to do away with costly time-wasting while worn-out nozzles are replaced with new nozzles—if you are searching for means to improve blasting efficiency and increase production—there is one answer for all three problems: NORBIDE Nozzles. Made of Norton Boron Carbide—the hardest man-made material—NORBIDE Nozzles will outwear conventional types fifty to one. This same wear-resistance enables these nozzles to retain peak efficiency for a long period with resultant production increases. Air consumption is reduced 10 to 20%. Stream contour and abrasive velocity are maintained.

For information as to size and price write for Bulletin No. 543

NORTON COMPANY

Worcester 6, Massachusetts

NORTON NORBIDE PRODUCTS

BIG HITS A

...and still bigger hits on the jo

Here's Why.....

- ★ **For green-topping of cores.**
- ★ **For dry compound cores.**
- ★ **For oil sand cores (any green bond strength).**
- ★ For use with your present equipment—open or closed, wood or metal boxes—up to 18" wide, 12" high, 24" long.
- ★ Blows single cores weighing up to 40 lbs. each—or 40 lbs. of small cores, without refilling or moving blow head.
- ★ Blow plate does not have to be changed—master plate blows all cores through one hole.

FEDERAL'S NEW
SAN-L
SAND BLOW

Here's Why.....

- ★ Mixes 4,000 lbs. of core oil sand, dry core compound sand or facing sand per hour.
- ★ Small and compact—weighs only 1,060 lbs. Does not require a foundation. Easily moved.
- ★ Two whirling, flexible, spring steel arms provide correct pressure on sand.
- ★ No crushing of sand grains—no overheating of sand.
- ★ Produces an extremely uniform sand mixture.
- ★ Provides a fluffy sand that does not need aerating.
- ★ Discharge door 28" off floor, high enough for a 3 cubic foot wheelbarrow.

FEDERAL'S NEW
WHIRLA
SAND MIXER

THE FEDERAL FOUNDRY
4600 East 71st Street

CHICAGO
CROWN HILL, W. VA.
CHATTANOOGA, TENN.
MINNEAPOLIS

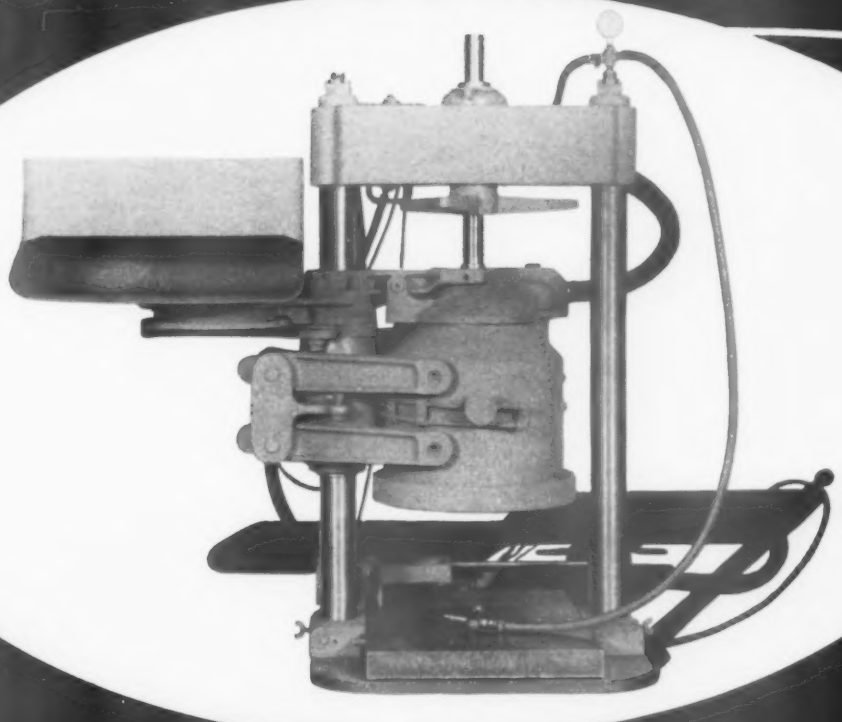
AT THE SHOW!

he job!

AL'S EW

N-LO

D BOWER



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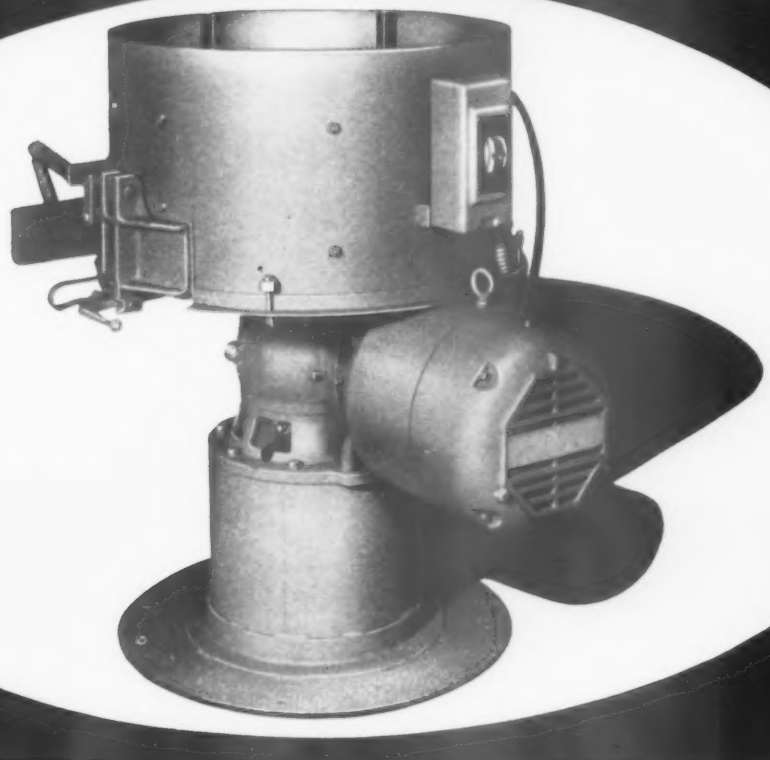
RLAIX

MIER



NDRY SUPPLY COMPANY

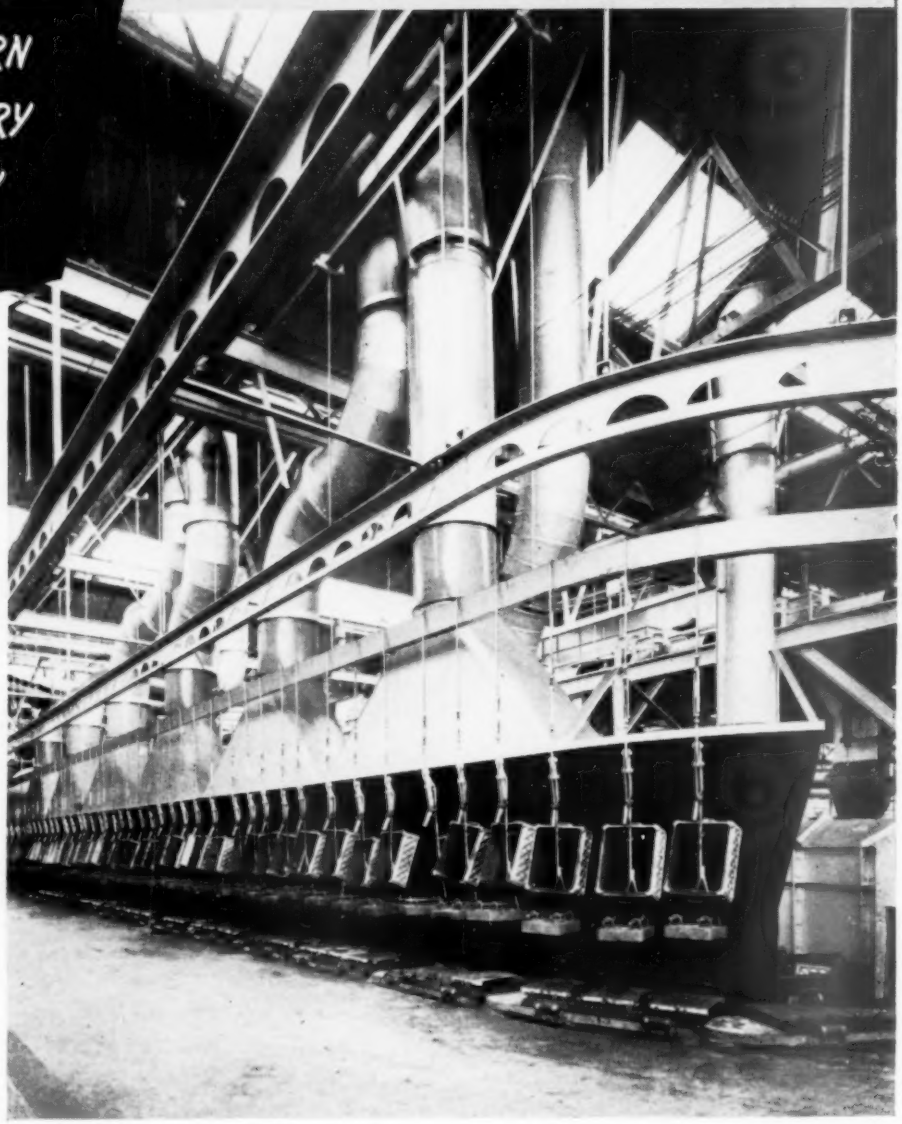
Cleveland 5, Ohio

MILWAUKEE RICHMOND, VA. ST. LOUIS

NEW YORK DETROIT UPTON, WYO.

Smoke and Fumes GONE WITH THE WIND

...IN THIS MODERN SOUTHERN FOUNDRY INSTALLATION BY KIRK & BLUM



WHEN hot metal meets moulding sand, there's bound to be smoke and fumes. But there's no need for smoke and fumes to contaminate the air in a modern well-ventilated foundry. At the pouring station in one of the south's new gray iron and steel foundries, smoke and fumes are not a problem.

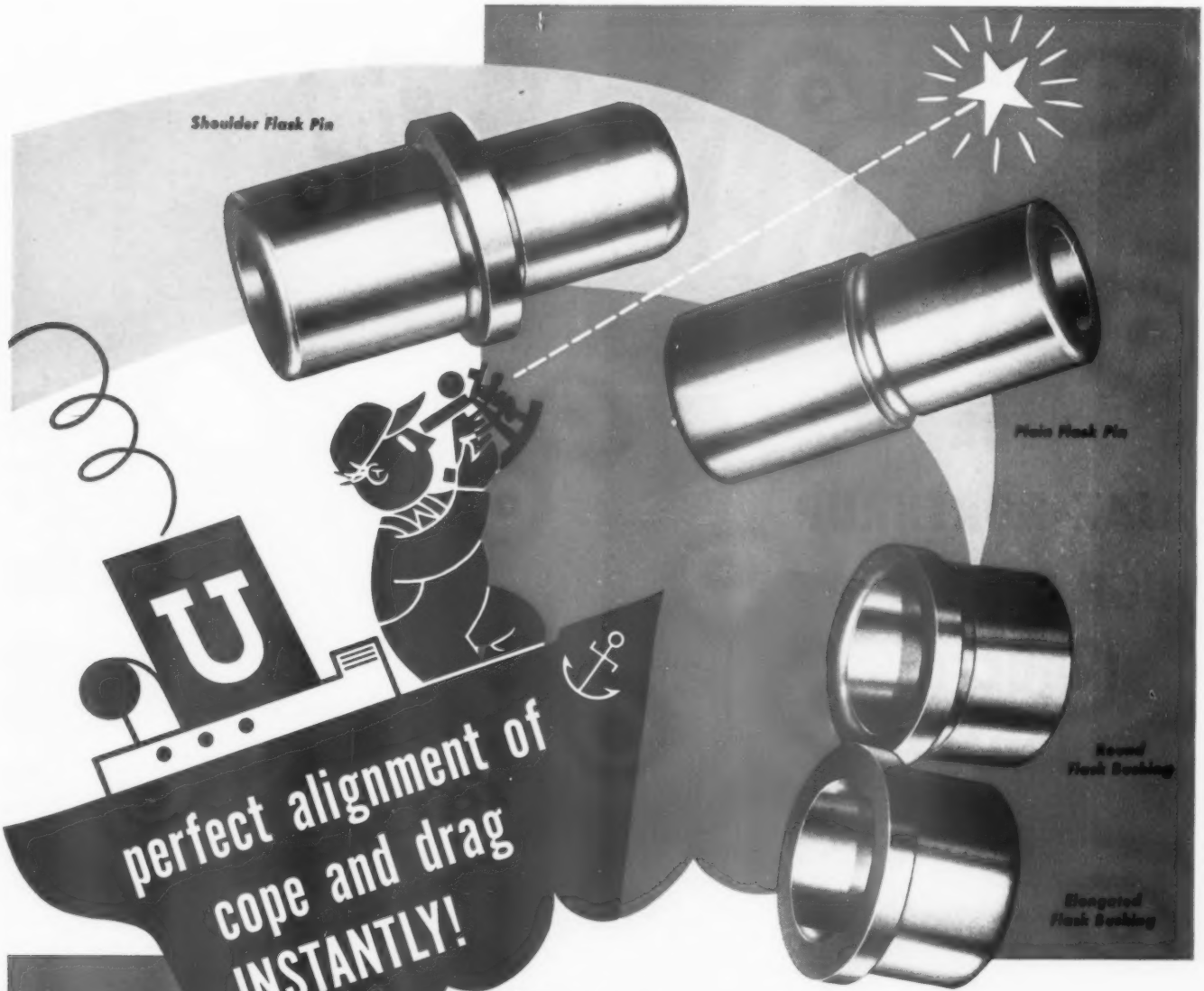
All piping is installed in accordance with A. F. A. specifications. All sections are joined by gasketed companion angle rings, with conveniently located clean-out doors.

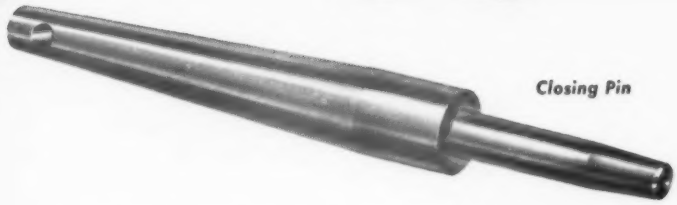
This modern smoke and fume control system was fabricated and installed by Liberty Engineering and Mfg. Co., a division of Kirk & Blum. For any foundry dust, fume, smoke or ventilation need, consult KIRK & BLUM, an organization of engineers and craftsmen . . . experienced in design, fabrication and installation of complete systems. For detailed literature and information write The Kirk & Blum Mfg. Co., 2808 Spring Grove Ave., Cincinnati 25, Ohio.

FOR CLEAN AIR . . . THE INVISIBLE TOOL

KIRK AND BLUM

DUST & FUME CONTROL SYSTEMS





with UNIVERSAL flask pins, bushings and closing pins

No sighting is necessary to get perfect cope and drag alignment when you use Universal Flask Pins, Bushings and Closing Pins. No time is wasted. Lifting and setting *in one smooth operation* does the job with Cope Pins quickly guided to Drag Pins over tapered loose-fitting Closing Pins which are quickly removed without effort. The Elongated Flask Bushing is specially designed to permit longitudinal expansion to compensate for metal heat *without affecting accurate alignment.* Available for immediate delivery in standard sizes—special sizes and types to order. Direct your inquiries and orders to the office nearest you—1060 Broad St., Newark, N.J., and 5035 Sixth Ave., Kenosha, Wisconsin—or write to our home office.

UNIVERSAL ENGINEERING COMPANY

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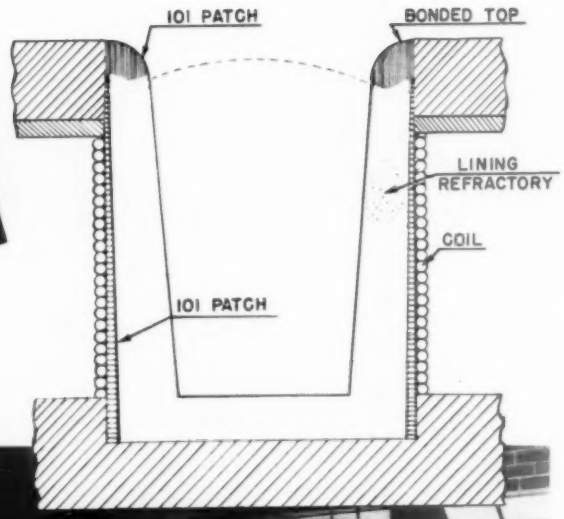
TASIL NO. 101 PATCH

FOR AJAX-NORTHRUP HIGH FREQUENCY INDUCTION FURNACES



TASIL No. 101 Patch in Ajax-Northrup Furnace

● Taylor Sillimanite No. 101 Patch provides two-fold protection of the water cooled, copper primary coil in Ajax-Northrup and similar types of induction furnaces—during the ramming of the crucible proper—and in the event of a leak through the crucible while the furnace is in operation. Properties which qualify TASIL No. 101 Patch for service in these furnaces are:

★ High di-electric strength
★ Smooth working properties
★ Softening point above 3200° F.
★ Negligible shrinkage or expansion
★ Can be used with either an Acid or Basic lining.

REMEMBER: a complete line of TASIL (mullite), TACOR (corundum base) and Taylor Zircon Ramming Mixes and Cements are made to fit every metallurgical need.

Refractorers to industry since 1864.

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IT'S NEW

AQUA-SET '50'

Phenolic Resin CORE BINDER

This liquid type phenolic resin binder is a clear red in color. At no extra cost for top strength it offers many additional benefits for the foundry.

It develops more strength than oil, pound for pound!

Normal ovens bake it much faster!

It can be cured in seconds with dielectric heat!

Core collapse is geared to ferrous metals!

We have prepared some technical data sheets on the use and behavior of Aqua-set "50" and will be glad to send them on request.

UNITED OIL MFG. COMPANY
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CUPOLA TO BULL LADLE

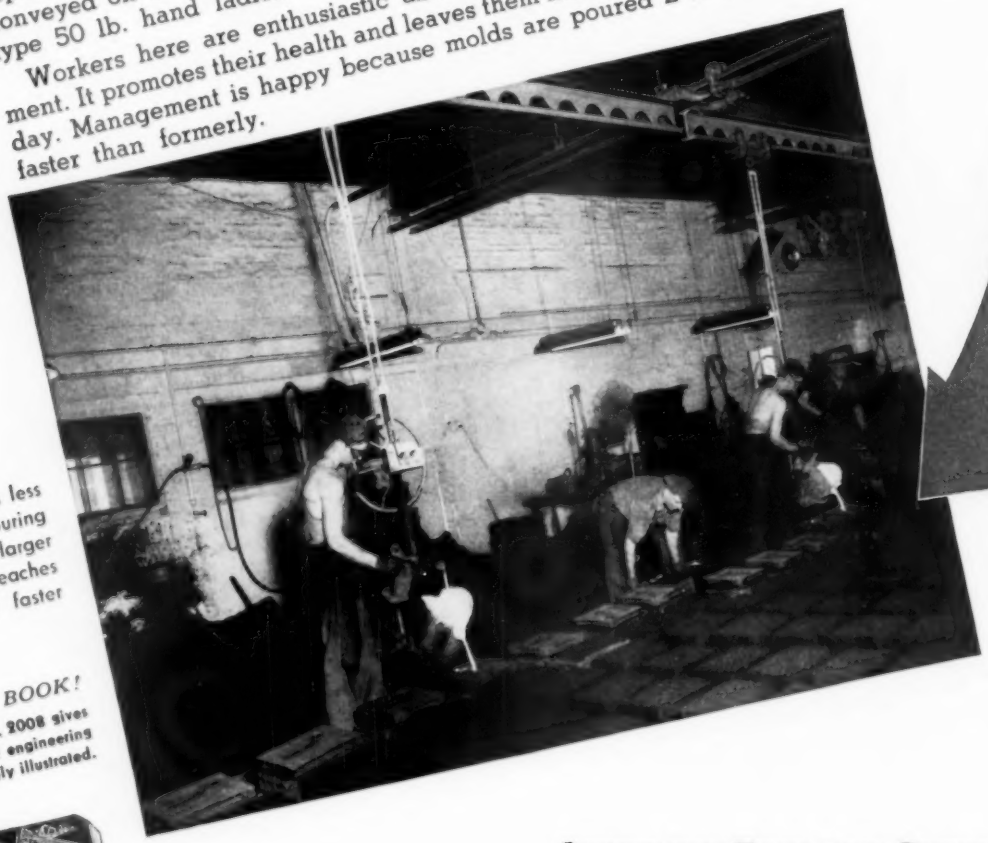
MOLDS POURED 2 to 3 TIMES FASTER

Both workers and management of many foundries are profiting by installations of Cleveland Tramrail. Hard lifting and carrying of heavy ladles are eliminated. Production is speeded and costs cut.

The photographs are of a typical installation. Large molds are poured with bull ladles carrying metal direct from cupola without repouring. Small molds are poured with 200 lb. mechanical ladles conveyed on Tramrail cranes. Four such ladles replaced many old type 50 lb. hand ladles.

Workers here are enthusiastic about Cleveland Tramrail equipment. It promotes their health and leaves them fresher at the end of a day. Management is happy because molds are poured 2 to 3 times faster than formerly.

POURING LADLE TO MOULDS



Heat loss is less because pouring ladles are larger and metal reaches molds in faster time.

GET THIS BOOK!

CATALOG No. 2008 gives construction and engineering details. Profusely illustrated.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
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CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

38 YEARS AGO THIS FOUNDRY FOUND THE ANSWER

Well-known producer relies on U. S. Rubber to keep down grinding wheel costs

HOW TO MAINTAIN production while keeping grinding costs down? Today that's a major problem. Back in 1912 a leading malleable iron foundry was faced with the same problem, and the management found the answer by turning to U. S. Rubber—the abrasives experts since 1863.

THE FOUNDRY MEN knew that "U. S." had research facilities which not only thoroughly covered abrasives and bonds, but also extended into all the fields covered by the many products of United States Rubber Company.

THE FOUNDRY picked U. S. Wheels and has been using them ever since. Whether you're snagging castings or grinding ball races, there's a U. S. Royalite Wheel engineered precisely to the job—carefully tested in both factory and laboratory.

For your own particular needs, you can obtain in advance accurate grinding costs with U. S. Royalite Wheels from one of our trained field engineers, who will make thorough tests right in your own plant. Write to:

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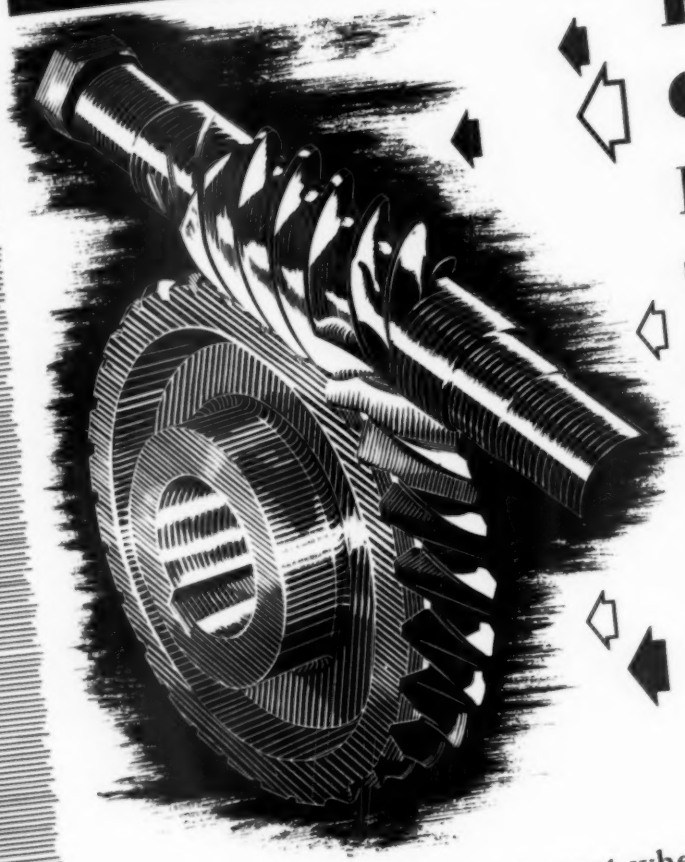
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

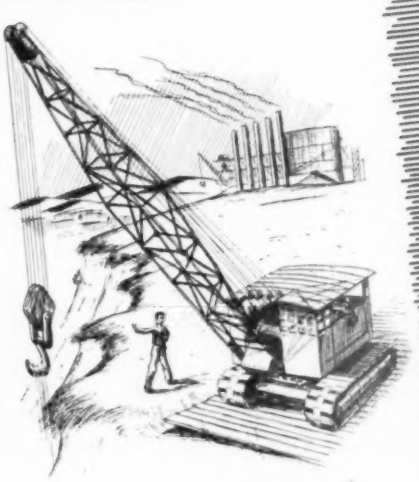
MECHANICAL GOODS DIVISION, ROCKEFELLER CENTER, NEW YORK 20, N. Y.

MODERN INDUSTRIAL DESIGNERS KNOW..



Bronze Gears Retain Their Physical Properties Under Constant Usage

Bronze gear wheels are a *must* when used with hardened steel worms in speed reducing systems. The bronze gear teeth maintain their correct form due to the regenerating action of the hardened worm.



Only in bronze can be found the unusual combination of plasticity, durability, strength and wear resistance required for this type of service.

Specify—LAVIN NON-FERROUS INGOT—*Quality*

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Refiners of Brass, Bronze and Aluminum

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REPRESENTATIVES IN PRINCIPAL CITIES

Bulletin on SUPER REFRACTORIES

by CARBORUNDUM
TRADE MARK

NO. 7 JUNE, 1950

Why Are They Called Super Refractories?

Super refractories are so called because their "custom-made" properties permit their use in certain applications where, for various reasons, other refractories may fall short.

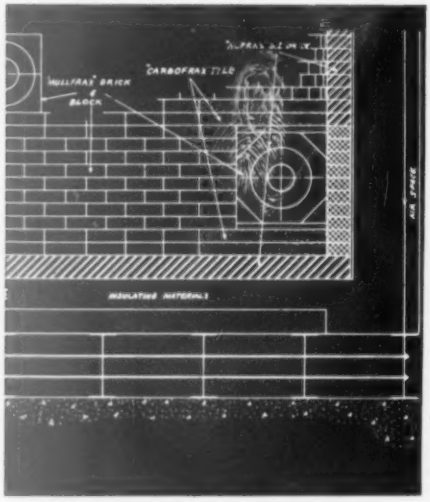
The principal constituents of most super refractories are produced in the electric furnace, and for that reason, are sometimes termed "electric furnace refractories." Among these synthetic raw materials are silicon carbide, aluminum oxide and mullite, each of which has unique properties of particular value in a refractory. Silicon carbide for example, is characterized by high thermal conductivity, great hardness, high mechanical strength and resistance to thermal shock. On the other hand, electric furnace mullite has relatively low heat conductivity, high hot strength, chemical stability and excellent resistance to corrosive slags.

These distinctive properties are retained to the highest degree in the finished super refractory by combining a maximum amount of a specific raw material with specially selected bonds. By varying the constituents to enhance certain characteristics, a variety of each type of super refractory is obtained, each one suitable to some set of unusual service requirements.

Physical Properties of Super Refractories by CARBORUNDUM
Trade Mark

	CARBOFRAX Silicon Carbide	MULLFRAX Electric Furnace Mullite	MULLFRAX S Converted Kyanite	ALFRAX K Electrically Fused Alumina	ALFRAX B Electrically Fused Alumina	ALFRAX BI Electrically Fused Alumina
Heat Conductivity at 2200° F. in BTU/hr. sq. ft. and °F./in. of thickness	109 BTU	16 BTU	9 BTU	24 BTU	12 BTU	7 BTU
REFRACTORINESS PCE CONE	37-40	38-39	37-38	37-39	39-40	38-39
SPALLING RESISTANCE	High	High	High	Good	Good	Good
ABRASION RESISTANCE	High	Medium	Medium	High	Medium	Low
THERMAL EXPANSION (25° — 1400° C.)	.0000044	.0000059	.0000069	.0000074	.0000086	.0000086
MODULUS OF RUPTURE @ 2460° F. PSI	800-3125	100-250	175-475	100-1050	100-225	50-100
WEIGHT 9 IN. STRAIGHT	9.25 lbs.	9 lbs.	8 lbs.	10.1 lbs.	7.25 lbs.	4.8 lbs.

Why 3 Different Super Refractories Are Used



To obtain balanced, efficient operation in this air pre-heater, three different super refractories are employed in zones where the unique properties of each are best fitted to deliver the greatest possible benefit.

MULLFRAX electric furnace mullite brick line the combustion zone. Here their extremely high refractoriness and chemical stability assure long periods of trouble-free service in this critical high temperature location.

CARBOFRAX silicon carbide tile span the burner flues. Their high strength and resistance to heat shock keep repairs to this section of the setting at a minimum.

ALFRAX BI electrically fused alumina brick are used in the upper section of the furnace. Their low heat capacity and high refractoriness provide efficient, low cost operation.

As a result of this balanced combination of *super refractory* characteristics, overall operating cost is low.

Super Refractory Slag Hole Blocks Assure Continuous Runs

Through the use of CARBOFRAX silicon carbide slag hole blocks in continuous-pour cupolas, expensive delays for slag hole replacement during a run are eliminated. These dense, durable blocks resist slag erosion — original hole size is maintained even through runs of 18-20 hrs. There is practically no enlargement even when the blast is on. Also aiding satisfactory performance is the high resistance of these super refractory blocks to spalling, cracking and elevated temperatures.

"Carborundum," "Carbofrax," "Mullfrax," "Silfrax," "Alfrax" are registered trademarks which indicate manufacture by The Carborundum Company

Address all correspondence to: Dept. A-60, THE CARBORUNDUM COMPANY, Refractories Division, Perth Amboy, New Jersey

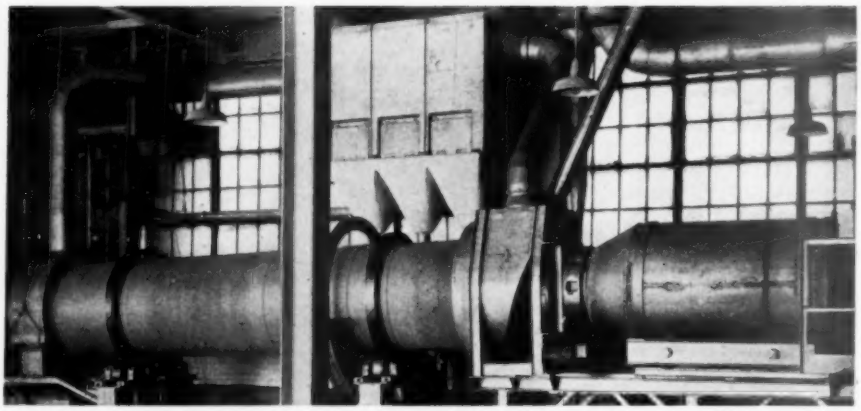
Continued on other side →

← Continued from other side

How Unique Properties of Super Refractory Paid Off

Until ALFRAX B electrically fused alumina brick were used to line the combustion chamber of this rotary type abrasive grain dryer, the extremely high temperatures developed quickly broke down the other lining materials. Repairs and/or replacements were required on an average of once a month. However, after installing ALFRAX B brick, service life was extended to two years.

This super refractory material successfully withstands extremely high temperatures, resists flame erosion, and

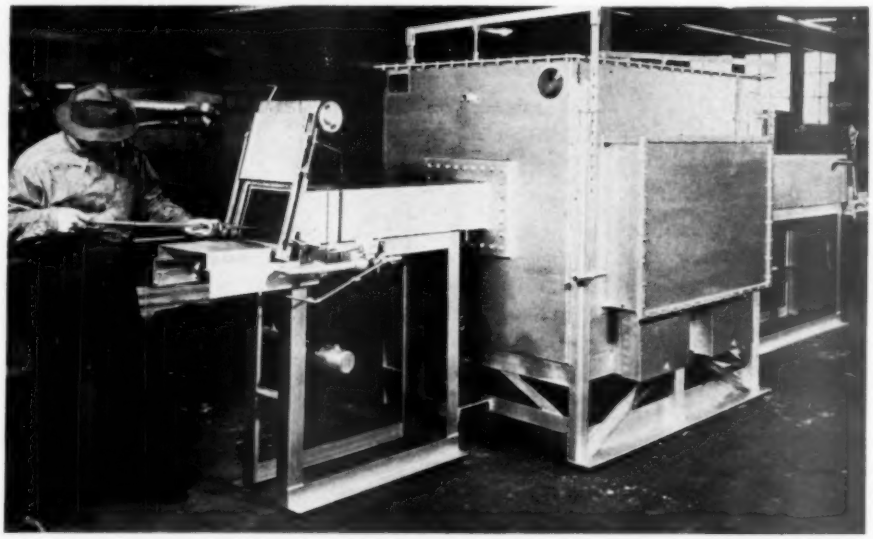


has a comparatively low heat conductivity. As a result greater output is obtained, labor costs are way down and considerable savings on replacement materials are effected. Such benefits are typical when super refractories are correctly applied to special applications like this one.

Extra Efficiency Realized With Super Refractories

The unique properties of super refractories are used to excellent advantage in this Harper electric furnace to obtain improved furnace performance at lower fuel and repair costs. The CARBOFRAX silicon carbide hearth, installed in the hot zone of this continuous sintering and brazing unit, offers high thermal conductivity, resistance to abrasion and high refractoriness. Heat is transmitted rapidly and uniformly to the work and the furnace can be operated with a lower heat head thereby relieving the severity of conditions imposed on other refractories. The service life of the hearth is extended, fuel consumption lowered and repairs and replacements cut.

ALFRAX K electrically fused alumina piers, supporting the hearth, successfully resist the softening effects of high temperatures — help maintain a flat, level floor at all times. The hearth, at either end of the hot zone, is con-

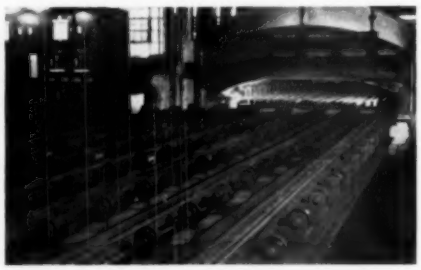


structed of MULLFRAX S converted kyanite tile because of their low heat conductivity, good resistance to spalling, cracking and abrasion. This combination of properties, — found only in super refractories — helps reduce replacement costs still further while eliminating furnace outages for repairs.

A Better Product Finish Because of Super Refractories

The finish on stainless steel sheets produced in this annealing furnace was improved materially as the direct result of installing a CARBOFRAX silicon carbide muffle. The atmosphere required for this better finish is readily maintained. There is less oxide or scale formation on the sheets. The cold rolled finish is retained. A considerable reduction in pickling time is realized.

One of the principal properties of the CARBOFRAX material that makes its use so desirable in this type of application is its high heat conductivity. The sheets are quickly and evenly heated. Temperature control is steady and accurate. Fuel consumption shows practically no increase (as compared with open firing) while fuel combustion is more efficient. Also, a long muffle life is assured because CARBOFRAX tile are



very resistant to high temperatures, cracking and spalling.

The improved bright finish provided by the CARBOFRAX muffle is protected from scratching and marring during annealing through the use of specially designed CARBOFRAX skid rails. These rails resist heat shock and high temperatures while their high thermal conductivity reduces the possibility of non-uniform heating of the sheets.

This combination of benefits was made possible only by the use of *super refractories.*

To obtain facts and figures on installations in specific fields merely select from this list of bulletins. Copies will be sent you at once. No obligation, of course.

Super Refractories by CARBORUNDUM (general catalog)

Super Refractories for the Ceramic Industry

Super Refractories for the Process Industry

Super Refractories for Boiler Furnaces

Super Refractories for Heat Treatment Furnaces

Super Refractories for Gas Generators

The Frax Line of Cements

CARBOFRAX Refractory Skid Rails

Porous Media for Filtration & Diffusion

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THE CARBORUNDUM COMPANY

Refractories Division

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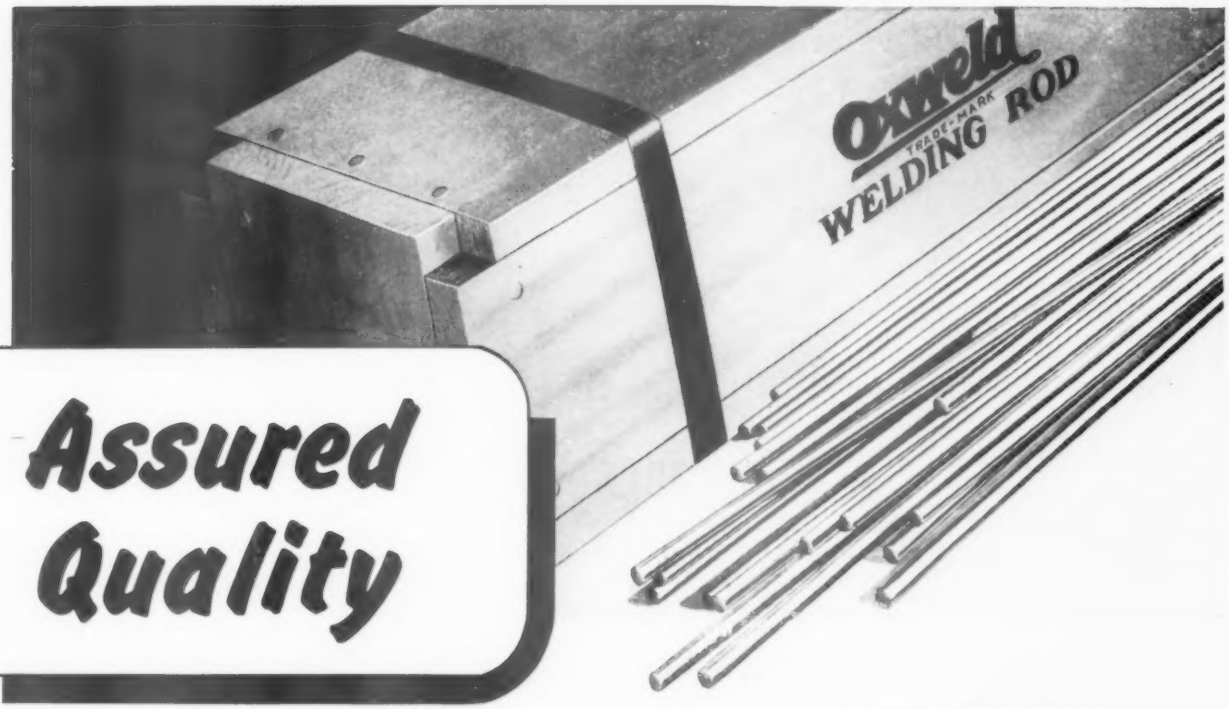

Assured Quality

The quality of any weld—its strength, ductility, grain structure, machinability, surface finish—depends largely on the rod used to make it. Only the best rods consistently give good welds of uniformly high quality. Only the best can help you to weld better and faster at lower cost . . . and help to make your job easier, too.

There are two good reasons why OXWELD Welding Rods are the best that modern science knows how to make. First, their rigid specifications are carefully worked out in LINDE research laboratories, which are among the largest and best equipped in the world. Second, LINDE engineers at production points constantly check during manufacture to see that the rods conform to these specifications.

They inspect ingots and billets, sample heats for chemical analysis, make flame and weldability tests, weld and test coupons for strength and ductility. In short, every known precaution is taken to maintain a uniformly high standard.

Every OXWELD Welding Rod that goes to market is of proved physical and chemical analysis . . . free from all objectionable properties and impurities. The OXWELD trade-mark is your guarantee of quality and satisfaction.

The terms "Oxweld," "Prest-O-Weld," and "Purox" are registered trade-marks of Union Carbide and Carbon Corporation.

These 5 Rods Handle a Complete Range of Welding

OXWELD NO. 1 H.T.

OXWELD No. 1 H. T. Steel

For all high-strength steel welding. Develops tensile strengths 11,000 lb. per sq. in. higher than ordinary steel.

OXWELD NUMBER SEVEN

OXWELD No. 7 Drawn Iron

A remarkably ductile, copper-coated rod for all run-of-shop steel welding on materials up to ¼-inch thick.

OXWELD NO. 25 M. BRONZE

OXWELD No. 25M Bronze

A superior rod for all braze-welding, building up wearing surfaces, and fusion welding of copper alloys.

OXWELD NO. 23

OXWELD No. 23 Aluminum

For all-purpose welding of aluminum and its alloys. Prevents weld cracking by absorbing cooling stresses.

OXWELD No. 9 Cast Iron

An ideal rod for fusion welding gray iron castings. Weld metal is fine-grained, soft, and easily machined.

9 additional welding rods and 8 hard-facing rods for more specialized work.

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Advertisement

ELECTROMET Data Sheet

A Digest of the Production, Properties, and Uses of Steels and Other Metals

Published by Electro Metallurgical Division, Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. • In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

How to Control Composition of Cast Iron With Silicon and Manganese Briquets

Control of the composition of cupola-melted cast iron becomes a simple matter through the use of alloy briquets.

These briquets make the old practice of blending two or three pig irons of high and low silicon and manganese contents, to produce a desired composition, both unnecessary and undesirable. A single grade of pig iron can be stocked, and any desired composition in the product can be obtained, simply and economically, by the addition of silicon and manganese briquets.

Function of Silicon in Iron

In cast iron, silicon acts as a deoxidizer and graphitizer. It promotes the formation of flake graphite and softens the iron.

When either the carbon or silicon content of an iron is too low for the section thickness involved, the result will be the formation of chilled spots (iron carbide) at corners and in other rapidly cooled locations. This has an adverse effect on the machinability of the iron and the life of the tools used to machine it. On the other hand, excessively high carbon or silicon content in heavier sections results in open-grained iron that is both soft and weak.

How Silicon Aids Carbon Control

A rather definite relationship exists between the silicon level in a pig iron and its carbon content, as shown in Figure 1.

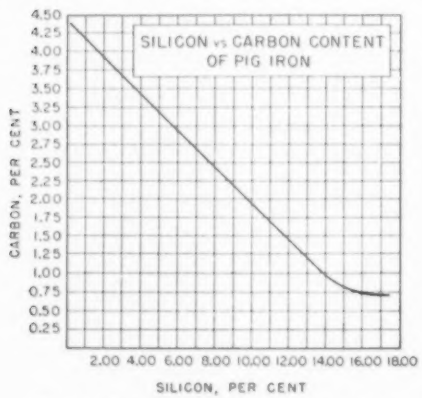

Fig. 1—Relation of silicon and carbon content in pig iron. Notice that the carbon level gradually decreases as the silicon is increased.

As indicated in this chart, an increase in the silicon content of a pig iron has a decided effect in lowering its carbon content. When producing soft iron, where it is desirable to hold the carbon on the high side, pig iron running in the range of 2.0 per cent silicon is desirable in the cupola charge, rather than the higher silicon grades of pig sometimes used in these irons. The additional silicon needed to meet the desired chemical analysis can be easily and economically added to the charge in the form of silicon briquets. This provides an economical and flexible system of chemical control.

Function of Manganese in Iron

Manganese acts as a scavenger to deoxidize iron. As an alloying element, it imparts density and high strength. It combines with sulphur to form manganese sulphide, which does not have the harmful characteristics of the iron-sulphide inclusions that form when manganese is not present. A manganese-sulphur ratio of 6:1 is suggested.

Briquets Give High Alloy Recovery

Silicon and manganese briquets are available from ELECTROMET in the sizes shown in Table I. These "EM" briquets are all made with a binder that prevents oxidation until the alloy unites with the iron in the melting zone of the cupola. Thus, the recovery of alloy is high—usually over 90 per cent for silicon and about 85 per cent for manganese.

More Scrap, Less Pig in Charge

Foundries can use an increased amount of scrap in the charge because the analysis of the iron can be adjusted by adding "EM" briquets. This reduces material costs and makes possible substantial savings in cupola operation.

Booklet Available

Further information is given in our booklet, "Briquetted Alloys For The Iron Foundry Industry." To obtain a copy, free of charge, write or phone our nearest office: in Birmingham, Chicago, Cleveland, Detroit, Los Angeles, New York, Pittsburgh, or San Francisco.

The terms "EM" and "Electromet" are registered trade-marks of Union Carbide and Carbon Corporation.

Table I. "EM" Briquetted Alloys for Cupola Additions

Type of Briquet	Gross Weight	Alloy Content
"EM" Silicon Briquets (two sizes) Round	5 lb.	2 lb. Silicon
	2½ lb.	1 lb. Silicon
"EM" Silicomanganese Briquets Square	3½ lb.	½ lb. Silicon 2 lb. Manganese
"EM" Ferromanganese Briquets Oblong	3 lb.	2 lb. Manganese

Table II. Typical Briquet Mixture for Soft Gray Iron

Base Charge			Alloys in Charge Material			
			Silicon		Manganese	
Per Cent	Lb.	Material Charged	Per Cent	Lb.	Per Cent	Lb.
40.0	400	Pig Iron	2.25	9.00	0.75	3.00
40.0	400	Return Scrap	2.50	10.00	0.65	2.60
20.0	200	Purchased Scrap	2.28	4.56	0.55	1.10
100.0%	1,000 lb.	Total Base Charge		23.56		6.70
Briquets Required		4 Small Silicon Briquets		4.00		—
		½ Silicomanganese Briquet		0.25		1.00
		Total Alloys Charged		27.81 lb. Si or 2.78% Si		7.70 lb. Mn or 0.77% Mn
		Melting Recovery Factor		x .90		x .85
		Final Analysis of Iron		2.50% Si		0.65% Mn

Clean, Heated Make-Up Air *AT LOW COST* With This Off-The-Floor "Buffalo" Unit!

Where large amounts of foundry air are exhausted for dust removal, "Buffalo" Lowboy Units supply *economical* make-up air! Above is a typical installation—the unit drawing in outside air, cleaning it through throw-away filters and, in winter, heating it. In summer, unit acts as a fan and air cleaner. 3,400 to 35,000 c.f.m. capacities. Write for Bulletin 3704 and see the construction details and ratings that make "Buffalo" your best buy for make-up air.

- Compact, suspended heating and ventilating unit saves floor space!
- LARGE capacities! Few units required for large areas!
- Efficient blowers with STABLE pressure characteristics!

BUFFALO FORGE COMPANY

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Canadian Blower & Forge Co., Ltd., Kitchener, Ont., Branch Offices in all Principal Cities

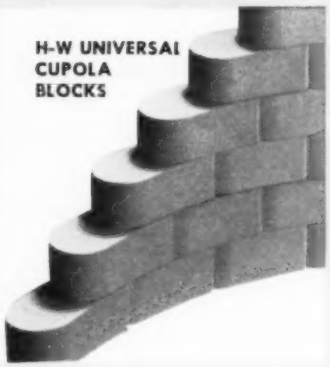
VENTILATING FORCED DRAFT | AIR WASHING COOLING | AIR TEMPERING HEATING | INDUCED DRAFT EXHAUSTING PRESSURE BLOWING

Harbison-Walker

specialized FOUNDRY *refractories*

help you reduce costs and improve your castings

CUPOLA REFRACTORIES


H-W UNIVERSAL CUPOLA BLOCKS

In cupola operation, the nature of the charge, method of charging, character of flux, use of inoculators, ash content of fuel and melting conditions, all influence the proper choice of refractories. Harbison-Walker provides a variety of specialized refractories for cupolas from which the types and brands best suited to the particular service may be selected. These include Tap-Out and Slag-Hole Blocks, patching and ramming materials and mortars.

In addition to the manufacture of the full complement of conventional brick shapes and cupola blocks, Harbison-Walker introduced the H-W Universal Cupola Blocks. By their use, joint erosion is much reduced and the need for stocks of more than one size of radial block is obviated because the Universal block fits any cupola diameter.

MOULD REFRACTORIES

STRAINER CORE SHAPES

The use of Harbison-Walker Gate and Runner Brick greatly reduces difficulties caused by sand inclusions in castings. Gate and Runner Brick sizes of $1\frac{1}{2}$" bore and larger are available.

Harbison-Walker Refractory Strainer Core Shapes reduce rejects and contribute to greater foundry efficiency through the elimination of slag and strainer core sand inclusions. Made of a hard, strong, ceramic material, they do not spall or erode during pouring. Seven sizes are regularly furnished.

Harbison-Walker Breaker Core Shapes placed in the flask provide necked-down risers without core boxes, patterns or baking. They save time and money in the foundry cleaning room where riser bodies are removed from castings.

BREAKER CORE SHAPES

In the production of heavy castings, the bonding strength and refractoriness of moulds must be maintained for relatively long times and at high temperatures. For this service, Harbison-Walker provides Moldsand Bond and the highly refractory moulding medium, Calamo.

LADLE REFRACTORIES

For the lining of mixing, receiving and holding ladles, Harbison-Walker high-fired super-duty fireclay brick, high duty fireclay brick or plastic fire brick may be used. Harbison-Walker Insulating Fire Brick are used as backing. Large pouring and transfer ladles usually have refractory brick linings, and the smaller have monolithic refractory, with bottoms of fireclay brick.

Harbison-Walker offers a complete range of shapes, refractory plastics, ganister, clays, sleeves and bonding mortars for foundry ladle service.

Harbison-Walker Technical Service will gladly help you select the materials that will best serve your particular requirements.

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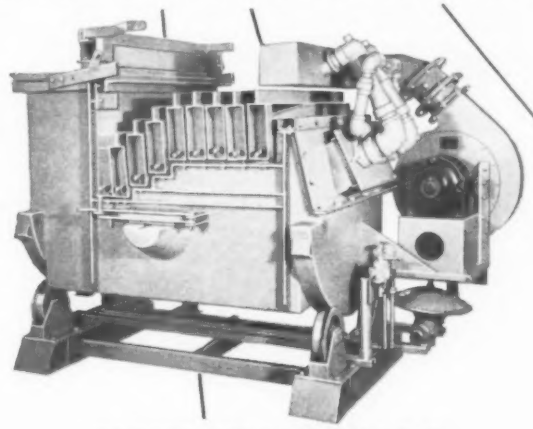
...FASTER MELTING
...BETTER SHOP CONDITIONS!

These four leading Stroman Furnaces are merely a part of the tremendous complete line of furnaces that Stroman makes for use in Foundries, Die Casting, Permanent Mold and Sand Casting Plants. Remember . . . Stroman builds any type or size furnace for any or all size melting problems. Each type furnace does its job exceptionally well, assuring lowest fuel costs, easiest operation, fastest melting and longest life. They are the furnaces you should consider above all others, for they are the acknowledged leaders in the field. Send your melting room problems to Stroman today . . . their engineers, who are qualified experts in melting room procedure and layout, will be only too glad to consult with you and offer suggestions for improvements and savings.



ECONOMELT FURNACES

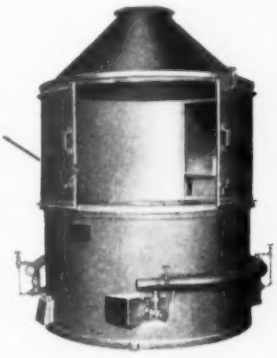
The finest direct fired reverberatory melting furnace ever offered. Melting speed for Brass, Bronze, Grey Iron or Aluminum is unmatched. Continuous charging. Cold metal does not reach the molten bath causing it to chill. All metal is preheated and melts in suspension. This furnace shows upward of 40% savings in fuel costs. Oil, gas or combination oil-gas fire. Capacities (Brass or Iron) up to 6000 lbs. Write for Bulletin 635 giving full information.

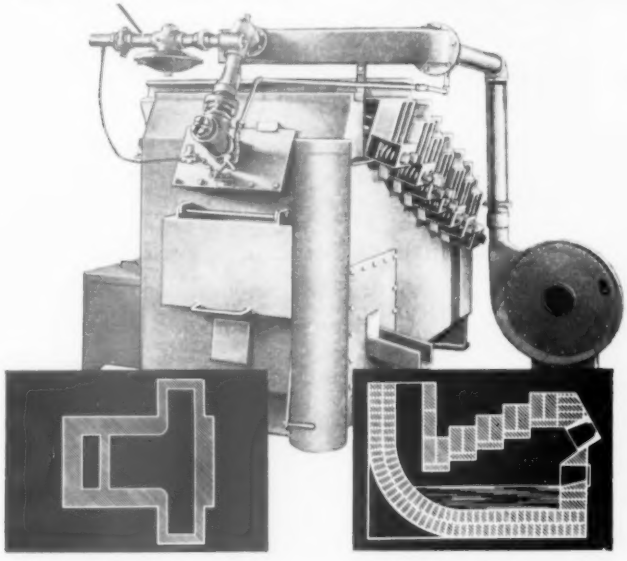
STROMAN RM STATIONARY CRUCIBLE MELTING AND HOLDING FURNACES FOR ALUMINUM

Built especially for use in permanent mold and die casting plants where molten metal is dipped from furnace with a hand ladle. Melting is done in crucible (no iron pick-up). Thoroughly insulated to protect the operator from heat. Oil, gas or combination oil-gas fire. Capacities, 200 to 800 lbs. Available with full automatic controls.

STROMAN IRON POT MELTING FURNACES FOR ZINC OR ALUMINUM

These furnaces are highly recommended as breakdown furnaces for zinc and aluminum die casting and permanent mold plants. They also excel as holding furnaces. They can be supplied either with or without hoods to exhaust fumes and heat. Their construction assures longest pot life and lowest fuel costs. Choice of automatic or manual controls and oil or gas fire. Capacities from 212 to 14,000 lbs. zinc.





Horizontal view showing 2 dip-out boxes.

Vertical view showing combustion chamber, metal bath, charging hopper and clean out door.

STROMAN MODEL MC ALUMINUM REVERBERATORY DIP-OUT FURNACE

It's New! Continuous charging and pouring make it without equal in low fuel and maintenance costs plus quality castings. Two Stromans in one . . . the combination of breakdown and holding furnaces makes this the most economical furnace ever designed for aluminum melting. It can be used for melting, holding, alloying fluxing for either casting or producing ingots. Cold metal does not reach the molten bath. Hot metal is always available for dipping. No iron pots or crucibles to buy. Bath capacities range from 500 to 10,000 lbs. Oil, gas or combination oil-gas fire.

Write for Complete Information at Once

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.

STARRBIDE CRUCIBLES

do a record job for "Empire"!

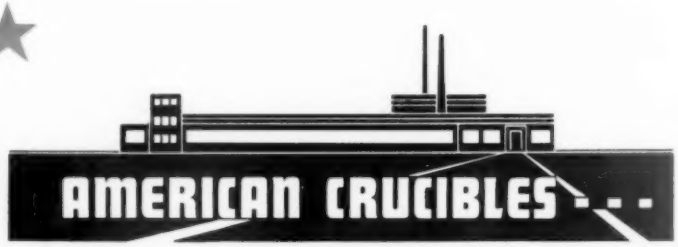
★ ★ ★

From a small beginning, Empire Brass Foundry, Bridgeport, Conn. has grown to one of the largest and most progressive brass foundries in New England. Mr. Studioso, the aggressive and capable President of "Empire", was one of the first to recognize the unique, high production advantages of Starrbide Crucibles. Here are his reasons for changing to STARRBIDE:

1. Heats can be taken out 10 minutes faster after the first heat.
2. 40 to 50 lbs. greater capacity per heat melting red brass.
3. An average of two extra heats per day per furnace.
4. Furnace men prefer the lighter weight of STARRBIDE.
5. Crucible and fuel cost per pound of metal melted are less with STARRBIDE.

Empire Brass uses #90 and #300-T STARRBIDE CRUCIBLES. Tell us your problem and we'll be glad to make specific recommendations without obligation. Circular on request.

★



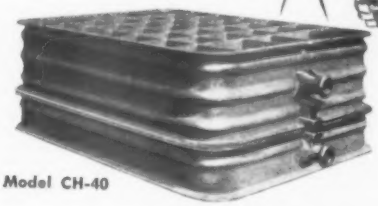
AMERICAN CRUCIBLE COMPANY
NORTH HAVEN • CONNECTICUT • U. S. A.

TRUSCON
MARK OF MERIT PRODUCTS

TRUSCON STEEL FOUNDRY FLASKS

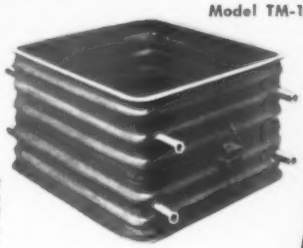
just say "*Truscon*..."

Model OM-1



Model CH-40

Model TM-10



Truscon manufactures one-man, two-man and power handled flasks available to meet your own particular production requirements.

A battery of Truscon Steel Flasks in use in a large mid-west foundry.

and there's the *flask* you need!

Truscon has scores of different types of flasks to meet a wide range of foundry requirements. And if your needs are something special, Truscon has the engineering ability to tailor-make the exact units you require. Truscon's long experience in flask design . . . Truscon's highly efficient facilities for flask production and service . . . Truscon's long association with flask users in every branch of the foundry industry . . . these are *plus* features that make your dollar investment in Truscon Steel Foundry Flasks so much more profitable. Write for catalog showing wide range of Truscon Steel Flasks available, and ask for an experienced Truscon foundry man to help plan your needs efficiently.

TRUSCON STEEL COMPANY

PRESSED STEEL DIVISION • 6202 TRUSCON AVENUE • CLEVELAND 4, OHIO
SUBSIDIARY OF REPUBLIC STEEL CORPORATION

COLEMAN OVENS

provide SAVINGS not po

-proved continuously from 1905 to 1950

by Landers, Frary & Clark, New Britain, Connecticut

1905 ..."*the Coleman Rolling Drawer Ovens which you built for us are giving excellent satisfaction... baking very uniformly... we are saving nearly 50% on fuel... you have proved beyond doubt that we were considerably behind the times on our ovens*".

1950 ..."*we have experienced most satisfactory results from our Coleman Tower Oven from every core baking angle, namely, even more uniform baking, better temperature control and ease of handling cores... in addition the appearance of our core room has been improved immensely*".

Here is undeniable proof, over a period of 45 years, that COLEMAN OVENS bake cores at the lowest cost. No other method... no other system of core baking can match this record.

COLEMAN OVENS produce cores at lower cost than any other method because only COLEMAN OVENS give you all these cost-saving advantages:

- THE FINEST AND MOST DEPENDABLE BAKING METHODS assure perfect baking and drying. Rejects and make-overs are eliminated.
- THE GREATEST FUEL SAVINGS and the use of the most economical fuel available are made possible through heating systems of outstanding quality.
- THE LARGEST SAVINGS IN LABOR result from the most efficient handling system for your production.
- THE MOST SATISFACTORY BINDER for your casting requirements—oil or resin.
- THE MOST ADVANTAGEOUS USE OF YOUR AVAILABLE PRODUCTION FLOOR SPACE obtained through the most efficient mechanical design.
- THE LOWEST COST for up-keep and service resulting from heavy duty construction.

To obtain savings not possible with any other method, install COLEMAN OVENS. Records from almost 50 years of service to the foundry industry, and over 10,000 installations prove that COLEMAN OVENS produce cores at lower cost than any other method.

For information regarding COLEMAN OVENS, write for Bulletin 48.

A COMPLETE RANGE OF TYPES:

COLEMAN OVENS are built in a complete range of sizes and capacities for every core-baking and mold drying requirement: Tower Ovens, Horizontal Conveyor Ovens, Car-Type Ovens, Transrack Ovens, Rolling Drawer Ovens, Portable Core Ovens, Portable Mold Dryers, etc.

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

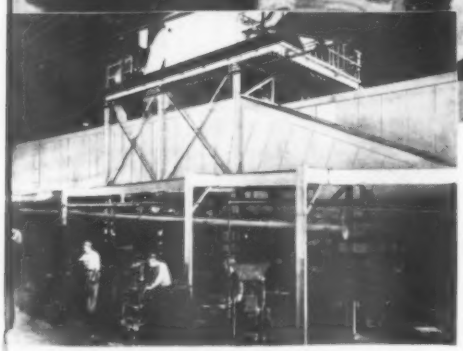
THE FOUNDRY EQUIPMENT COMPANY

FEMA

1831 COLUMBUS ROAD CLEVELAND 13, OHIO

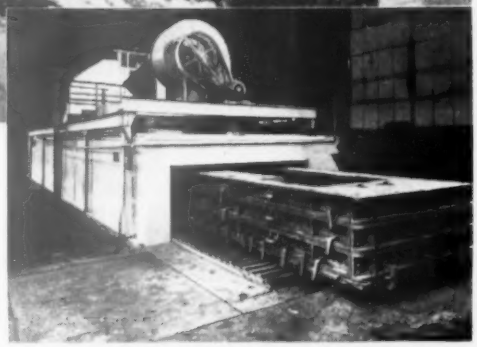
t possible with any other method

Lynchburg Foundry Company, Lynchburg, Va.

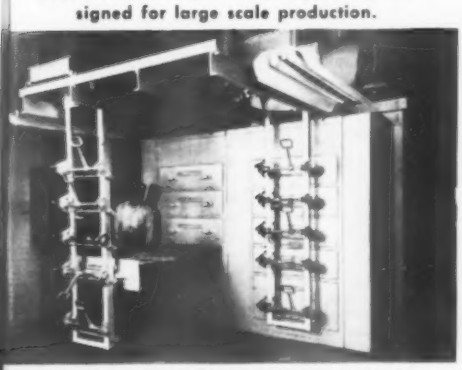


COLEMAN HORIZONTAL CORE OVENS. Overhead conveyor ovens specially designed for large scale production.

COLEMAN TOWER OVENS. For high speed production at lowest cost. Patented Open Center Loading Aisle provides greatest loading efficiency and maximum labor saving.



COLEMAN CONTINUOUS MOLD OVENS. For high speed continuous drying of molds.

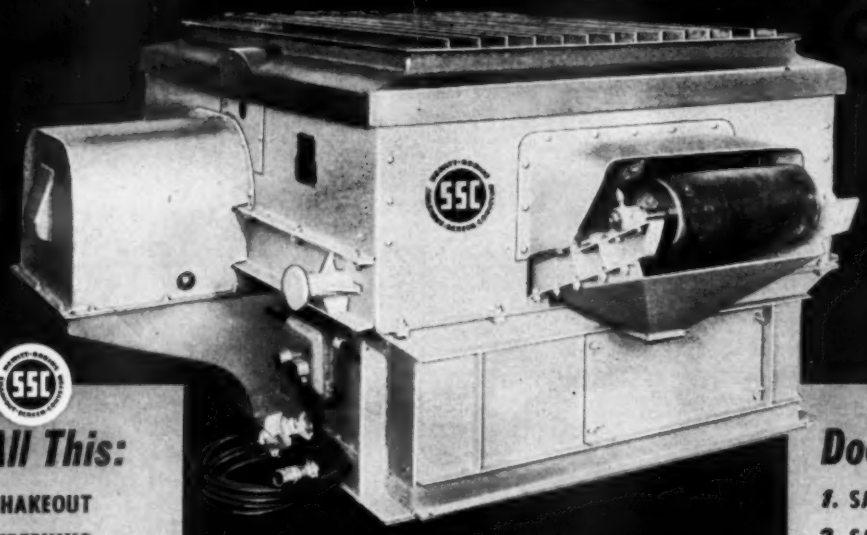


COLEMAN ROLLING DRAWER OVENS. For small and medium cores. High speed production with limited floor space.

COLEMAN TRANSRACK OVENS. For use with portable racks to reduce handling labor.

COLEMAN CAR-TYPE OVENS. For baking large cores or drying molds.

Now... FIVE FOUNDRY OPERATIONS WITH ONE PIECE OF EQUIPMENT!



Does All This:

1. FLASK SHAKEOUT
2. SAND SCREENING
3. LUMP BREAKING
4. CONVEYOR FEEDING
5. TRAMP METAL TRAPPING

Does All This:

1. SAVES TIME!
2. SAVES SPACE!
3. SAVES MONEY!
4. SAVES POWER!
5. SAVES MAINTENANCE!

Now You Can Mechanize for Complete Sand Reclamation with One Hewitt-Robins SSC Unit!

Think of it! A Shakeout . . . a Sand Screen . . . a Lump Breaker . . . a Feeder Belt Conveyor and a Tramp Metal Trap —all in one compact, self-contained, portable unit taking up no more space than a standard portable foundry shakeout. That's exactly what you get in the new Hewitt-Robins SSC unit. With it, your entire shakeout and sand handling operation is completed in a matter of minutes . . . more thoroughly, more economically, more efficiently than ever before! Here's what it does:

FLASK SHAKEOUT. The loaded flask goes on the deck of a time-tested Robins Floatex® Shakeout. Castings, risers, gaggers, etc., are quickly released for easy removal from the deck.

SAND SCREENING. Sand passes through an integral hopper onto a screening deck equipped with non-blind cloth. This deck is actuated by the shakeout vibrator; no extra motor or other equipment needed. (Here sand receives the second of *three* aerations during reclaiming.)

LUMP BREAKING. Loose sand falls through the non-blind cloth and passes under a self-activating lump breaker. Any small sand supporters still present are automatically discharged.

CONVEYOR FEEDING. After passing through the screening deck, the sand falls onto a Hewitt-Robins Belt Conveyor with a Maltese Cross® Fiberglas Belt capable of withstanding 350°F. Conveyor delivers sand directly into your conditioner or to any other means of delivering elsewhere.

TRAMP METAL TRAPPING. Metal particles small enough to pass through the shakeout deck and the screening surface are trapped by the permanently magnetized head pulley on the conveyor, and fall into a tote box or other receptacle placed beneath it.

The SSC Unit saves time; it's fast, completely automatic. It saves space; does five operations in one compact unit! It saves money; no costly screen to buy. It saves power; requires only 8¼ H. P. It saves maintenance; fewer parts to service or replace. It will be the greatest low-cost producer in your entire plant! Write for Bulletin 136, giving complete details, to Robins Conveyors Division. Passaic, N. J.

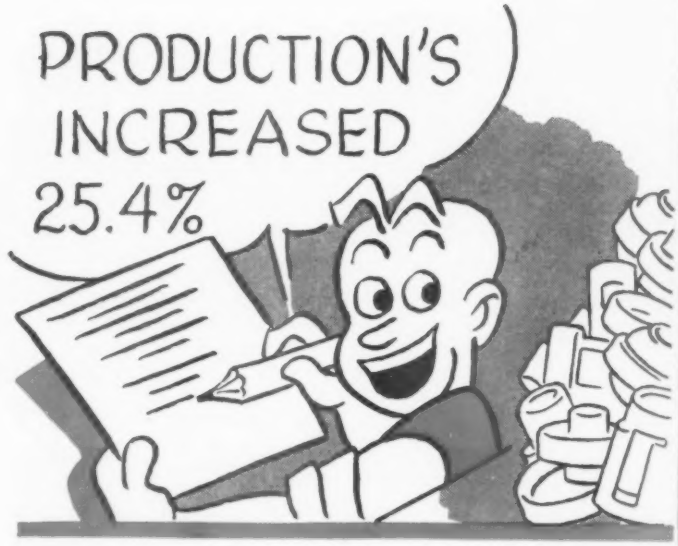
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

HEWITT-ROBINS

SSC UNIT

HEWITT-ROBINS INCORPORATED

BELT CONVEYORS (*belting and machinery*) • BELT AND BUCKET ELEVATORS • CAR SHAKEOUTS • DEWATERIZERS • FEEDERS • FOAM RUBBER PRODUCTS • FOUNDRY SHAKEOUTS • INDUSTRIAL HOSE • MINE CONVEYORS • MOLDED RUBBER GOODS • RUBBERLOKT ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS • STACKERS • TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS



Manufacturer* Cuts Blast Cleaning Costs 51.8% with MALLEABRASIVE

Test by Reading Gray Iron Castings Inc., of Reading, Pa. proves Malleabrasive saves 51.8% or $3,908.74 a year on blast cleaning costs in their plant.

If you want to save on blast cleaning costs . . . look at the results of this test made by Reading Gray Iron Castings, Inc. After just seven weeks the test showed that 5,900 lbs. Malleabrasive did the same job as 10,300 lbs. of conventional abrasive... replacement parts costs were down 64.7% . . . production increased 25.4% while the cost per ton cleaned was slashed by 51.8%. Here's concrete proof that Malleabrasive's the best abrasive you can buy!

Make Your Own Test!

We'll send you the data needed to run a comparative test like this right in your own cleaning room! Now you can prove to yourself that Malleabrasive slashes cleaning costs up to 50% and more. Malleabrasive is more than "heat treated" or "annealed". Malleabrasive is guaranteed to outperform ordinary abrasives when comparative tests are properly run.

For full details, plus a copy of other Malleabrasive tests, write for TEST INFORMATION, THE GLOBE STEEL ABRASIVE CO., Mansfield, Ohio.

Packed in new orange striped 100 lb. bags

Save on blast cleaning with

PATENTED† **Malleabrasive®**

†U.S. Patent #2184926
(other patents pending)

THE GLOBE STEEL ABRASIVE CO., MANSFIELD, OHIO

• MANUFACTURERS OF METAL ABRASIVES SINCE 1907 •

Are you getting this EXTRA 30% TOOL LIFE?

In machining gray iron castings that have been deoxidized with FERROCARBO silicon carbide Briquettes, it has been found that tools last as much as one-third longer. Other important savings are realized through reduced machining time and fewer rejected castings.

These economies result from the improved structure of the treated iron which is dense, close grained and free from chill or porous areas. This is true even in castings that vary widely in cross sectional area.

Our distributors are well qualified to explain in detail how these advantages can be obtained in your operation. The Carborundum Company, Bonded Products and Abrasive Grain Division, Niagara Falls, New York.

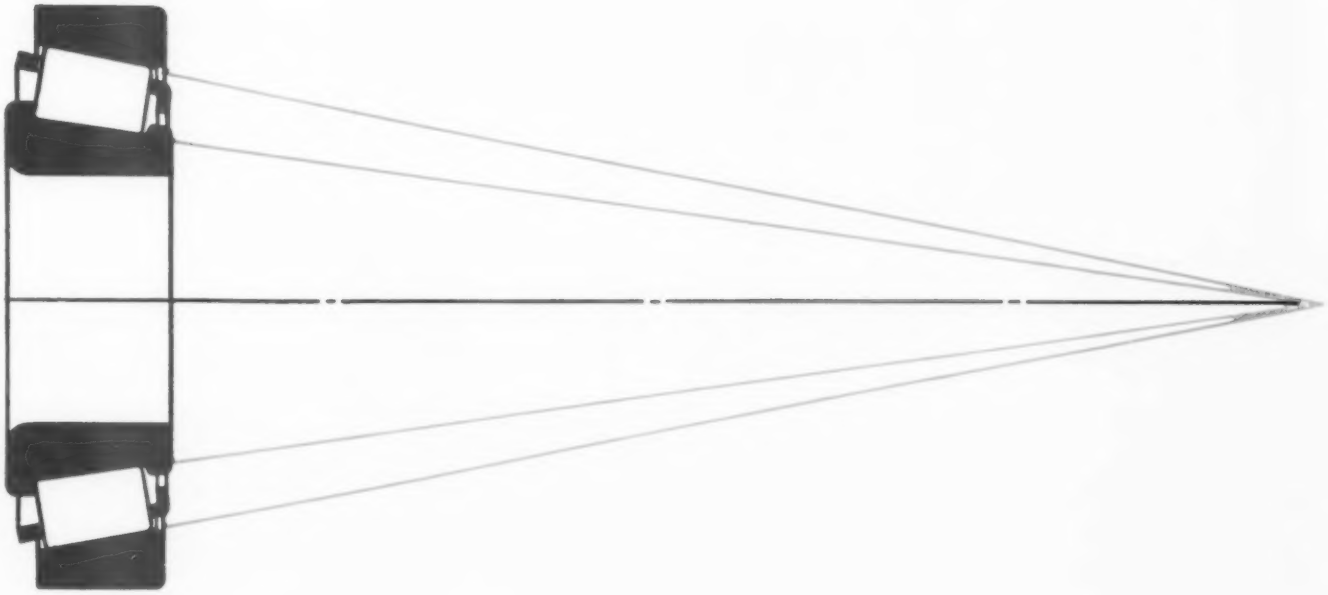
FERROCARBO Briquettes

BY CARBORUNDUM

TRADE MARK

FERROCARBO Distributors: KERCHNER, MARSHALL & CO., PITTSBURGH, Cleveland, Birmingham, Philadelphia and Buffalo; MILLER AND COMPANY, CHICAGO, St. Louis and Cincinnati; WILLIAMS AND WILSON, TORONTO, Montreal and Windsor.

"Carborundum" and "Ferrocarbo" are registered trademarks which indicate manufacture by The Carborundum Company



Here's an old angle to help solve your newest design problem

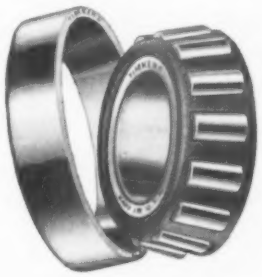
THE principle of true rolling motion illustrated in the diagram above is one of the outstanding reasons for the 50-year success of the Timken® tapered roller bearing.

The rolls and races of a Timken bearing are precisely tapered so that all lines coincident with their tapered surfaces always meet at a common point on the axis of the bearing. As a result, all rollers really roll. This true rolling motion means friction-free operation and minimum wear—helps hold precision longer.

Because of their tapered construction, Timken bearings carry both radial and thrust loads in any combination. Auxiliary thrust bearings or thrust plates are not needed. Tapered design also permits easy adjustment. Shafts are held in accurate alignment—end-play eliminated.

Due to the line contact between the rolls and races, Timken bearings have extra load carrying capacity. Timken bearings permit the use of effective closures that keep lubricant in—dirt out. Made of Timken fine alloy steel, they normally last the life of the machine.

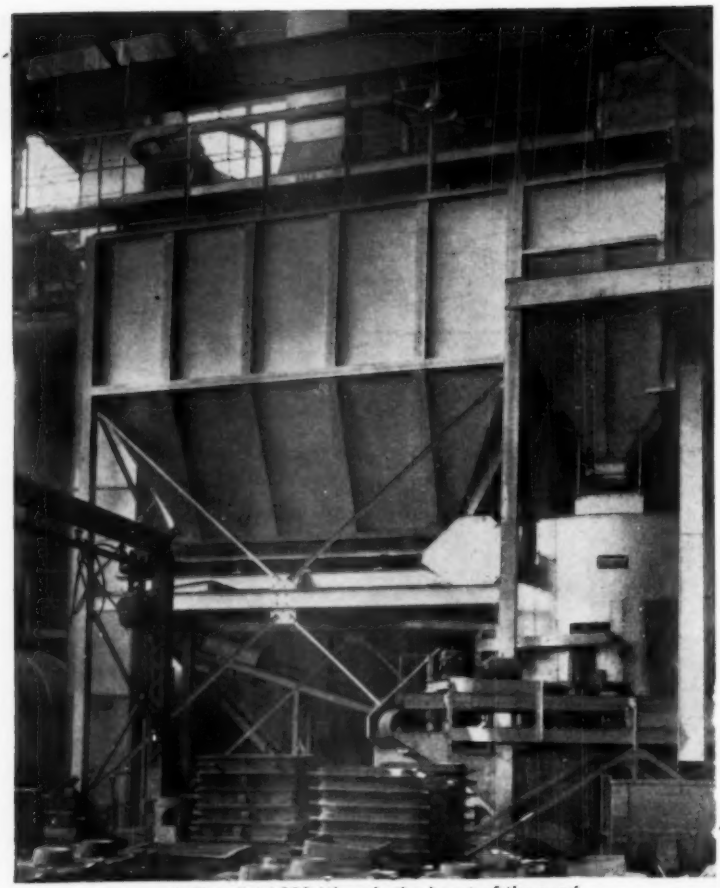
If you have a machine design problem, Timken tapered roller bearings may help you solve it. Timken bearings add a valuable sales feature, too—build greater acceptance with customers. When you specify bearings, specify "Timken". When buying new equipment, look for the trade-mark "Timken" on the bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".



TIMKEN

TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ▯ AND THRUST ▯ LOADS OR ANY COMBINATION ✳



A Clearfield 930 Mixer is the heart of the sand conditioning system in a gray iron foundry.

wherever foundry sand is used . . . .

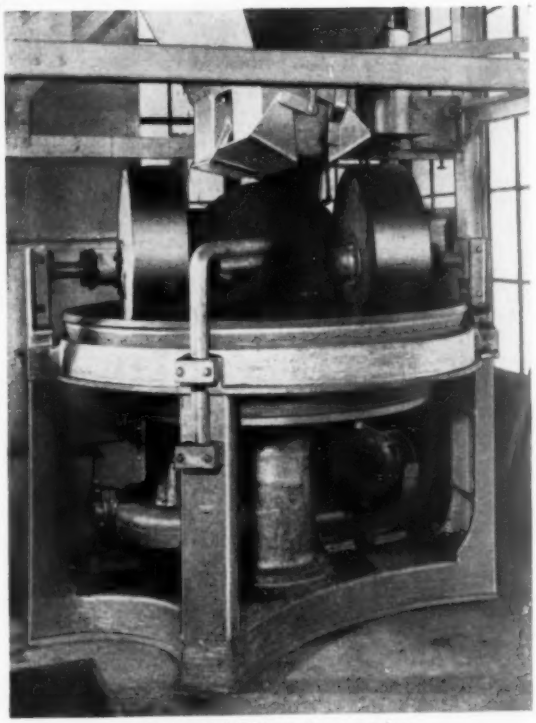
the

Clearfield Mixer *is needed*

A consistent and adequate supply of good foundry sand is indispensable to the efficient production of high quality castings—and that's the kind of sand supply the Clearfield Mixer turns out all the time. With a Clearfield you can assure yourself of the amount of sand you need, when you need it, where you need it and with the qualities you require.

Clearfield Mixers are available in a range of sizes to meet any requirement. As individual units or as part of an integrated sand processing system, Clearfield Mixers provide dependable, efficient and economical performance.

Write today for Catalog No. 79 for information.



A Clearfield Mixer in a modern brass foundry.

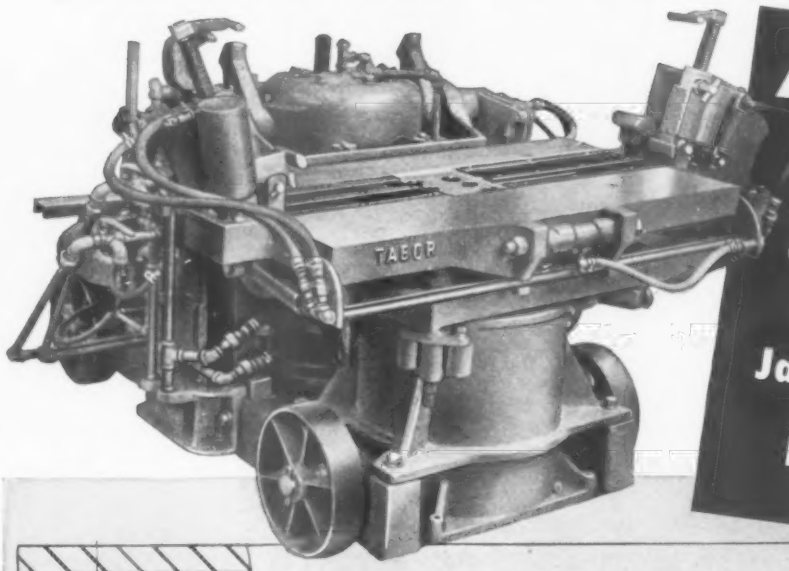
CLEARFIELD MIXER

MIXES, TEMPERS AERATES

CLEARFIELD MACHINE COMPANY

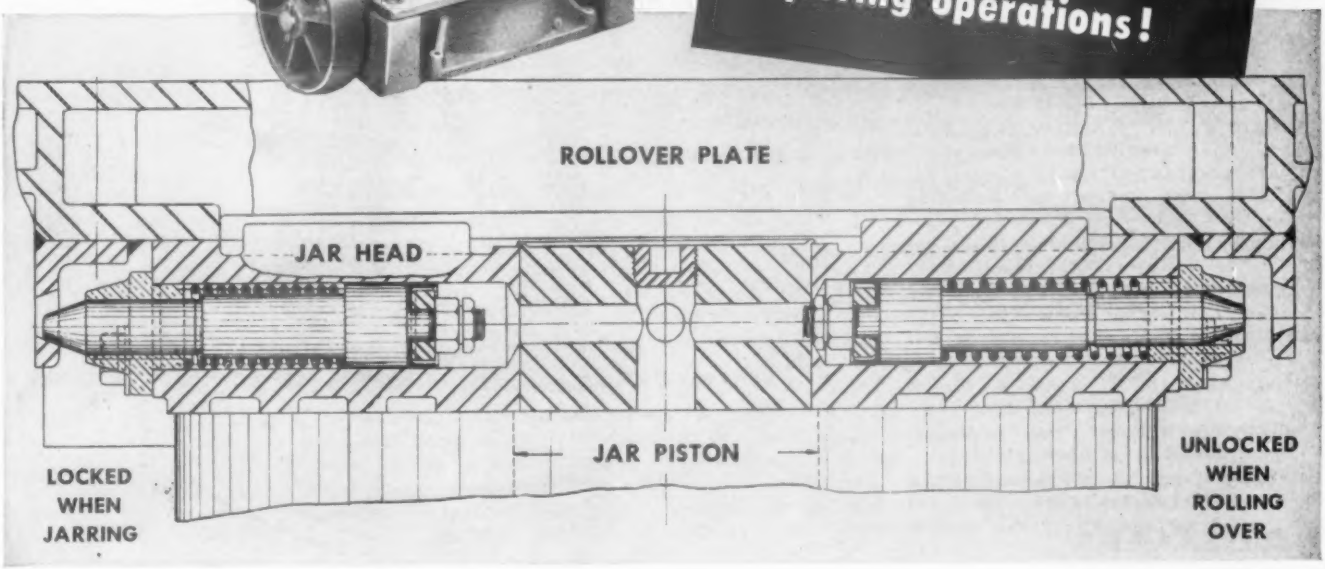
CLEARFIELD PENNSYLVANIA, U. S. A.

DID YOU SEE IT AT THE CONVENTION?



ANOTHER TABOR FIRST...

Rollover Plate and Jar Head locked during jarring operations!



ROLLOVER PLATE—JAR HEAD LOCKING DESIGN

The above sectional drawing illustrates Tabor's new locking arrangement. Jarring air pressure automatically throws rugged pins into seats under the rollover plate. Pins retract under spring tension when jarring valve is closed.

HERE'S a feature never before offered in jar, power rollover, power draw machines. New Tabor construction locks rollover plate and jarring mechanism *into one rigid assembly* the moment jarring air is introduced.

This gives you *four* distinct advantages:

(1) Effectiveness of jarring blow is increased 25%.

(2) Ramming effect is equalized *all over the mold.*

(3) Does away with unwanted "secondary jolt" between plate and jar head—adds greatly to life of both members.

(4) Eliminates all plate wobble, even when handling a mold with uneven weight distribution.

Always big producers, Tabor Rollovers also feature the new quick-change-over table which permits *independent* setting of all four clamps—a table design which is invaluable in either core room or jobbing shop where pattern changes are frequent.

Get full details. Write, wire, or phone today.

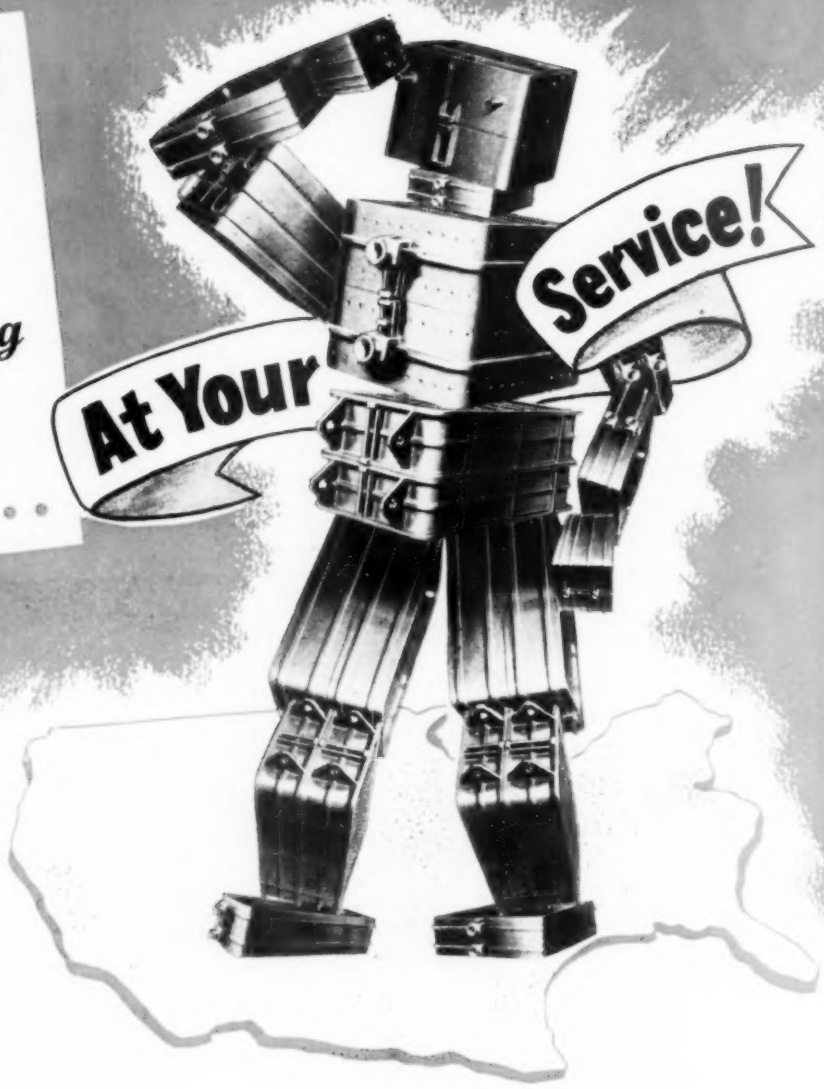
REPRESENTATIVES
Snyder Foundry Supply Company, Los Angeles, Calif.; The Pacific Graphite Company, Inc., 40th & Linden Sts., Oakland 8, Calif.; Carl F. Miller & Company, Seattle, Washington; E. R. Frost Company, Inc., Minneapolis 14, Minn.; Harry H. Reich, Trussville, Ala.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

The TABOR *Manufacturing Co.*

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES
6223 TACONY STREET • PHILADELPHIA 35, PENNA.

from COAST to COAST You'll find *Sterling* Branches and Dealers . . .



BRANCH OFFICES

BOSTON 9, MASS. ..... 141 Milk St.
R. T. Hunter, *District Mgr.*

BUFFALO, 2, N. Y. ..... 130 W. Chippewa St.
G. F. Goetsch, *District Mgr.*

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R. E. Kirchmayer, *District Mgr.*

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F. L. Coyne, *District Mgr.*

CLEVELAND 15, OHIO ..... 1836 Euclid Ave.
L. T. Crosby, *District Mgr.*

DETROIT 3, MICH. ..... 19150 John R St.
Steve Pasick, *District Mgr.*

NEW YORK 18, N. Y. ..... 25 W. 43rd St.
G. H. Lambkin, *District Mgr.*

PHILADELPHIA 4, PA. ..... 101 N. 33rd St.
F. J. Felsburg, *District Mgr.*

ST. LOUIS 5, MO. ..... No. 2 S. Brentwood Blvd.
C. W. Gullickson, *District Mgr.*

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A. C. Welding & Supply Co.	Birmingham 4, Ala.
Barker Foundry Supply Co.	Los Angeles 11, Calif.
Don Barnes Fdry. Supplies & Equipment	Hamilton, Ontario, Can.
The Brock Supply Co.	Houston 1, Tex.
The Buckeye Products Co.	Cincinnati 16, Ohio
Caswell & Company	Los Angeles 11, Calif.
Casco S De R. L.	Mexico, D. F.
Combined Supply & Equipment Co.	Buffalo 7, N. Y.
Dayton & Bakewell	Los Angeles 21, Calif.
Donald Sales & Manufacturing Co.	Milwaukee 3, Wis.
The Federal Foundry Supply Co.	Chicago 9, Ill.
The Federal Foundry Supply Co.	Cleveland 5, Ohio
The Federal Foundry Supply Co.	Milwaukee 2, Wis.
The Federal Foundry Supply Co.	New York 57, N. Y.
Fenton Foundry Supply Co.	Dayton, Ohio
Fischer Supply Co.	Chattanooga 2, Tenn.
Foundry Equipment Sales	Sparta, Mich.
The Foundry Supply Company, Inc.	Minneapolis, Minn.
Freeman Foundry Supply Co.	Toledo 5, Ohio
The E. R. Frost Company, Inc.	Minneapolis 14, Minn.
Frost Machinery Company, Ltd.	Winnipeg, Man., Can.
The General Foundry Service Corp.	Oakland 6, Calif.
The John M. Glass Co.	Indianapolis 4, Ind.
The Goehringer Foundry Supply Co.	Cincinnati 3, Ohio
Grant & Company	Los Angeles 21, Calif.
J. B. Hayes Co.	Birmingham 3, Ala.
The Hill & Griffith Co.	Birmingham 1, Ala.
The Hill & Griffith Co.	Chicago 50, Ill.
The Hill & Griffith Co.	Cincinnati 4, Ohio
Hoffman Foundry Supply Co.	Cleveland 13, Ohio
Hoosier Supply Co.	Indianapolis 7, Ind.
Independent Foundry Supply Co.	Los Angeles 11, Calif.
Industrial Foundry Supply Co.	San Francisco 3, Calif.
Interstate Supply & Equipment Co.	Milwaukee 4, Wis.
La Grand Industrial Supply Co.	Portland, Ore.
McArdle Equipment Co.	Houston 1, Tex.
J. S. McCormick Co.	Pittsburgh, Pa.
McGowan Company, Inc.	Los Angeles 21, Calif.
Carl F. Miller Co.	Seattle 4, Wash.
Minnesota Supply Co.	Minneapolis 15, Minn.
Mussens Canada Ltd.	Montreal 3, Que., Can.
Mussens Canada Ltd.	Toronto 12, Ont., Can.
Newman Foundry Supply Ltd.	Montreal, Que., Can.
New York Sand & Facing Co.	Brooklyn 5, N. Y.
The S. Obermayer Co.	Chicago 8, Ill.
The S. Obermayer Co.	Cincinnati, Ohio
Pacific Graphite Company, Inc.	Oakland 8, Calif.
Pennsylvania Foundry Supply & Sand Co.	Philadelphia 24, Pa.
George F. Pettinos, Inc.	Philadelphia 7, Pa.
George F. Pettinos Ltd.	Hamilton, Ont., Can.
Risney Foundry Equipment Co.	Wauwatosa 13, Wis.
Russo Foundry Equipment Co.	Oakland 3, Calif.
Sabin St. Germain & Assoc., Inc.	New York 17, N. Y.
Smith-Sharpe Co.	Minneapolis, Minn.
Snow & Galgiani	San Francisco 7, Calif.
Snyder Foundry Supply	Los Angeles 11, Calif.
Springfield Facing Co. Obermayer-Newark Division	Harrison, N. J.
Springfield Facing Co.	Willimansett, Mass.
Frederic B. Stevens, Inc.	Buffalo 12, N. Y.
Frederic B. Stevens, Inc.	Detroit 16, Mich.
Frederic B. Stevens, Inc.	New Haven, Conn.
Frederic B. Stevens of Canada Ltd.	Toronto 3, Ont., Can.
Frederic B. Stevens of Canada Ltd.	Windsor, Ont., Can.
Utah Foundry Supply Co.	Salt Lake City, Utah
A. T. Wagner Co.	Detroit 7, Mich.
West Coast Foundry Equipment Co.	San Francisco 5, Calif.
West Coast Foundry Equipment Co.	Los Angeles, Calif.
Western Foundry Sand Co.	Seattle 99, Wash.
Western Industrial Supply Co.	Portland 14, Ore.
Whitehead Brothers Co.	Providence 1, R. I.

Consult any Sterling Branch Office or Dealer, listed above, when in need of foundry flasks or other foundry equipment.

STERLING WHEELBARROW CO., Milwaukee 14, Wis., U.S.A.

Why Not Join Hands In Promoting Castings?

CAN the foundry industry increase its markets by forgetting, at least momentarily, the competitive angles between the various branches and embarking on a program to sell the value of castings as engineering materials to designers, engineers, manufacturers, and the public at large? Many believe such a project not only would produce a greater demand for cast parts, but that it is practically mandatory for the future progress of the industry.

The idea of an overall program of castings promotion probably originated in 1932 when an AFA-sponsored Joint Committee on Foundry Education in Engineering Schools proposed publication of a Cast Metals Handbook. This project later was taken over by the Handbook Committee, and three editions were issued. But those urging unified promotion see the Handbook as only one step in the co-operative sales effort. A broader, more aggressive program is urged.

During the past several years Bruce Simpson has been one of the most active proponents of a united effort to build a greater acceptance of castings. Before AFS chapters and meetings of trade associations, he has stressed the need of "a central investigating body of all foundrymen constantly busy on the development of new casting business without regard to the final metal composition."

Now a new champion of co-operative sales promotion has entered the ranks. In his presidential address at the Cleveland AFS convention, Edwin Horlebein outlined the problem and offered a plan of action:

"I have a strong belief that the foundry industry has not yet assumed its full responsibilities in another direction, the development of a strong and continuous program of castings promotion. This industry has now grown up, and most of our old jealousies and suspicions have been broken down. Through the National Castings Council, for instance, we have developed for the first time a Foundry Advisory Committee to the Munitions Board. Through the Foundry Educational Foundation we have learned how we can advance our mutual interests. Let us now direct our efforts into even broader channels.

"When will we realize that the engineers who design metal structures must be impressed—thoroughly and continuously—with the electrifying fact that the shortest distance between raw material and finished product is a CASTING? When will we as an industry learn to spend our dollars in stressing those inherent advantages that have made a casting the most useful and utilitarian of all metal structures? When will we employ our brains and our means to teach others that a casting is both a material and a process . . . and why that is so tremendously important to the engineers?

"It will require all-out foundry effort to bring the utility of all cast products to the attention of engineers. It is too big a job for any one firm or organization, or for any one segment of the industry. It is a job for all, if we are to avoid such duplications of effort as to leave the engineers in a hopeless welter of conflicting claims.

"Nothing will refute the charge that the foundry industry is "backward" so effectively and permanently as will such a joint endeavor—but someone must start the ball rolling. I propose, therefore, to those of you who represent the various foundry organizations, the formation of a Joint Castings Promotion Committee to explore the need and possibilities to develop a long-term plan and budget, and to report findings and recommendations to the 1951 convention of the foundry industry."

This suggestion makes sense. It should be given favorable attention by all segments of the industry.

Frank G. Steinebach
Editor

Technical Progress Evidenced at

AFS Convention

THE approximately 12,000 foundrymen who attended the 54th annual convention of the American Foundrymen's Society in Cleveland, May 8-12, found ample evidence attesting to the technical progress of the industry. This evidence was apparent in the comprehensive program of papers and discussions relative to foundry practices and research in casting fundamentals. It was also demonstrated by the extensive exhibit of latest developments in foundry equipment and supplies.

Although affected slightly by the railroad strike, attendance during the week measured up to that of the last Congress and Foundry Show, at Philadelphia in 1948. Large audiences marked the various technical sessions and shop courses. The annual banquet Wednesday evening attracted the largest attendance in history, while the registration of 355 lady visitors also was a new high. Numerous foreign countries were represented by convention registrants, including ECA Productivity Teams from Norway and Great Britain. The presence of N. P. Newman, president of the Institute of British Foundrymen, was the first time in 30 years a head of that organization has attended an AFS national convention. More than one hundred were present for an international reception tendered foreign visitors the afternoon of May 9.

High lights of the convention's nontechnical features were the annual business meeting May 10 and the banquet that evening. In the president's report at the former, Edwin W. Horlebein, Gibson & Kirk Co., Baltimore, touched on various society activities during the past year, including the eight research projects and work of approximately one hundred committees. He reported that the AFS financial condition is sound and that only a slight drop in membership had occurred since a year ago.

Mr. Horlebein indicated that the society would give increased attention to safety and hygiene studies in the future in what may be a ten-year program. In a plea for action in attempts to convince engineers that a casting is the shortest distance between raw material and the finished product, he urged that a joint castings promotion committee investigate methods for accomplishing this objective.

In concluding his report, Mr. Horlebein announced that the 55th annual convention would be held in Buffalo the week of Apr. 23, 1951.

Secretary-treasurer William W. Maloney then cast a unanimous ballot for election of officers and directors previously chosen by the nominating committee.

A record attendance of nearly 700 marked the annual banquet in the ballroom of Hotel Statler

These are: President, Walton L. Woody, vice president, National Malleable & Steel Castings Co., Cleveland; vice president, Walter L. Seelbach, president, Superior Foundry Inc., Cleveland. Directors to serve three years: J. J. McFadyen, general manager, Galt Malleable Iron Co., Galt, Ontario; J. O. Ostergren, president, Lakey Foundry & Machine Co., Muskegon, Mich.; Frank W. Shipley, foundry manager, Caterpillar Tractor Co., Peoria, Ill.; James Thomson, chief engineer, Continental Foundry & Machine Co., East Chicago, Ind., and E. C. Troy, foundry sales engineer, Palmyra, N. J. Retiring President Horlebein will serve one year as a director, and Martin J. O'Brien Jr., works manager, Symington-Gould Corp., Depew, N. Y., has been named to fill the unexpired term of the late Alfred M. Fulton, Northern Malleable Iron Co., St. Paul, Minn.

Mr. Maloney also announced winners of the 27th

WALTON L. WOODY
President-elect

WALTER L. SEELBACH
Vice President-elect

Above—President Horlebein presents awards to apprentices Eugene Chmielowicz, John W. Burkholder Jr., Worth Cropp Jr., Richard C. Tracy and Richard Bowman. *Left*—W. W. Levi delivering the annual Charles Edgar Hoyt Lecture. *Below*—These six men, along with Retiring President Horlebein, were elected directors at the annual AFS business meeting

annual AFS apprentice contest, which attracted almost 300 contestants from the United States and Canada. Winners of each of the contest's five divisions were present as guests of the society to receive their awards from President Horlebein. Division winners are: Gray iron molding—Richard Bowman, American Car & Foundry Co., St. Louis; Steel molding—Richard C. Tracy, Dominion Engineering Works Ltd., Montreal; Nonferrous molding—Worth Cropp Jr., Pacific Brass Foundry, San Francisco; Wood patternmaking—Eugene Chmielowicz, Motor Patterns Co., Cleveland; Metal patternmaking—John W. Burkholder Jr., Central Pattern Co., St. Louis.

FRANK W. SHIPLEY
Caterpillar Tractor Co.

MARTIN J. O'BRIEN JR.
Symington-Gould Corp.

JAMES THOMSON
Continental Foundry & Machine Co.

E. C. TROY
Foundry Sales Engineer

Foreign visitors at the Cleveland Foundry Congress included, left to right: N. P. Newman, president, Institute of British Foundrymen; John L. Sissener, leader of the ECA Productivity Team from Norway; Frank Hudson, England, who presented the exchange paper from the IBF, and Sven Toresson, chairman of the Swedish Foundrymen's Association

Greetings from foreign foundry organizations were extended personally by several visitors who had places on the speaker's platform. These included N. P. Newman, president of the Institute of British Foundrymen; John L. Sissener, leader, the ECA Productivity Team from Norway; Frank Hudson, leader of a similar team from Great Britain and author of the official IBF exchange paper presented at the convention; and Sven Toresson, chairman of the Swedish Foundrymen's Association.

Immediately following the business meeting, the Charles Edgar Hoyt Annual Lecture was presented by W. W. Levi, chief metallurgist, Lynchburg Foundry Co., Lynchburg, Va. Mr. Levi's lecture on "Operation of the Cupola" was an exceptionally detailed discussion of many factors involved in successful employment of this type melting unit. Some of the phases covered included preparation of the bed, makeup and placement of charges, influence of moisture in the blast, carbon control, slagging, etc.

At the annual banquet, the social high spot of the convention program, nearly 700 members and guests filled the ball room of Hotel Statler. Dr. Gulliam H. Clamer, past president, presented the Joseph S. Seaman gold medal to Dr. Clarence H. Lorig, Battelle Memorial Institute, Columbus, O., for many contributions to foundry metallurgy and for constant stimulation of research in the cast metals field. Max Kuniansky, past president, presented the William H. McFadden gold medal to Dr. Richard Schneidewind, University of Michigan, for his valuable contribution to the malleable iron industry in connection with the graphitization of white cast iron and for his many contributions to the society and the casting industry.

Howard F. Taylor, MIT, Cambridge, Mass., presented the scroll of honorary life membership to Clyde L. Frear, Bureau of Ships, United States Navy, Washington, for his long-time contributions to the society and for his work in co-ordinating casting processes with Naval requirements. Fred J. Walls, past president, presented a similar scroll to Ralph L. Lee, General Motors Corp., for his philosophical approach to the problems of the foundry industry and for his stimulation of pride of craftsmanship among foundrymen. Edwin W. Horlebein was enrolled in the honorary life membership group as retiring president of the society.

The meeting closed after a vigorous and inspiring address, "Students of Liberty," by Leonard E. Read, president Foundation for Economic Education, Irvington-on-the-Hudson, New York. The speaker developed his theme from the premise that the chief problem today is the loss of liberty by reason of the growth of compulsory collectivism. One of the major reasons for the spread of (*Please turn to page* 120)

J. J. McFADYEN
Galt Malleable Iron Co.

J. O. OSTERGREN
Lakey Foundry & Machine Co.

SHOW STRESSES HIGHER QUALITY, LOWER COSTS

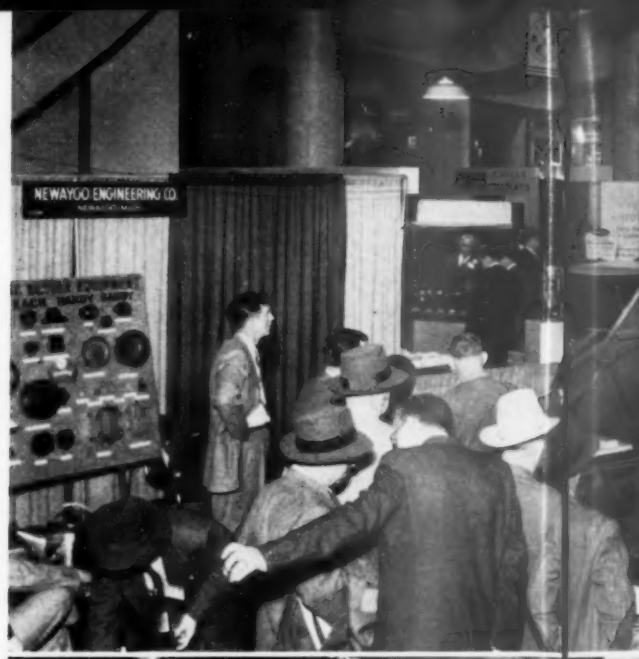
THE 1950 Foundry Show, held in Cleveland, May 8-12 under auspices of the American Foundrymen's Society, surely lived up to expectations and advance billings. Manufacturers of foundry equipment and supplies who participated in the exhibition provided the materials from which was fashioned one of the most interesting shows in the history of the industry. Practically every type of machine or device used by foundries, and most items of supply, were to be found in the large exhibition halls.

As might be expected, exceptional interest centered in the many operating exhibits. Visitors spent considerable time studying machines for handling the numerous types of materials used in the foundry, for preparing sand, making molds and cores, melting metal, collecting and handling dust and fumes, shaking out the molds, and cleaning the castings. New ideas or improvements in old designs were to be found in all of these fields, with increased emphasis noted on automatic and labor saving features.

The two exhibits producing castings attracted a great amount of attention. In one of these displays four exhibitors combined to pour an aluminum casting which probably will come in quite handy in many kitchens and other beverage dispensing points during the coming months. These castings were produced in two dry sand cores. Sand was mulled, the cores were blown and then dried in a tower oven. After the drying cycle, the cores were carried to the pouring station on roller conveyor, closed and poured with aluminum. After the knockout, the used cores were passed through a recovery system and the sand reclaimed for reuse.

The second exhibit producing castings utilized a thin shell mold produced with a mixture of fine silica sand and a small percentage of a resin binder. The shell mold was made by placing this mixture on a pattern, which in turn was placed in an oven to polymerize the mold shell. The two halves of the mold shell then were clamped together, supported in a container having metallic shot for backing material, and the castings poured.

Sales of products exhibited at the show were excellent, according to a spot check of numerous exhibitors, thus reflecting the current improvement in foundry operations in many sections of the country.



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SHOW STRESSES HIGHER
QUALITY, LOWER COSTS

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MOLDING MACHINES CORE BLOWERS

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...Gives sand the "VELVET FEEL"

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RENTONITE SAND

BAKELITE DIVISION
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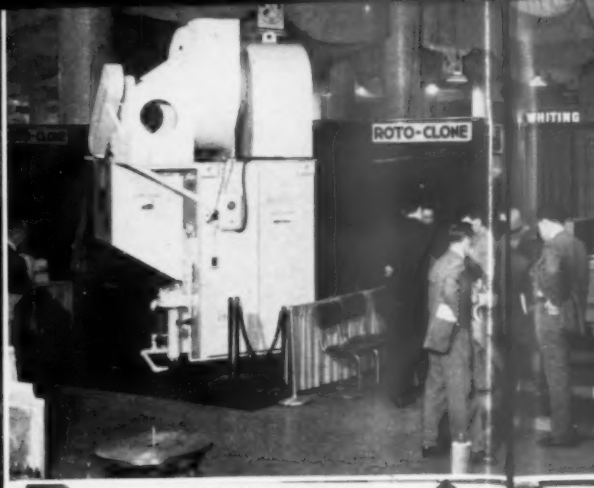
STEP BY STEP TO PRECISION CASTING

ROOTS-CONNERSVILLE BLOWER CORP



SHOW STRESSES HIGHER QUALITY, LOWER COSTS

DELTA
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SCHNEIBLE
bvb
FOUNDRY HOODS
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BLAW-KNOX FOUNDRY BUCKETS

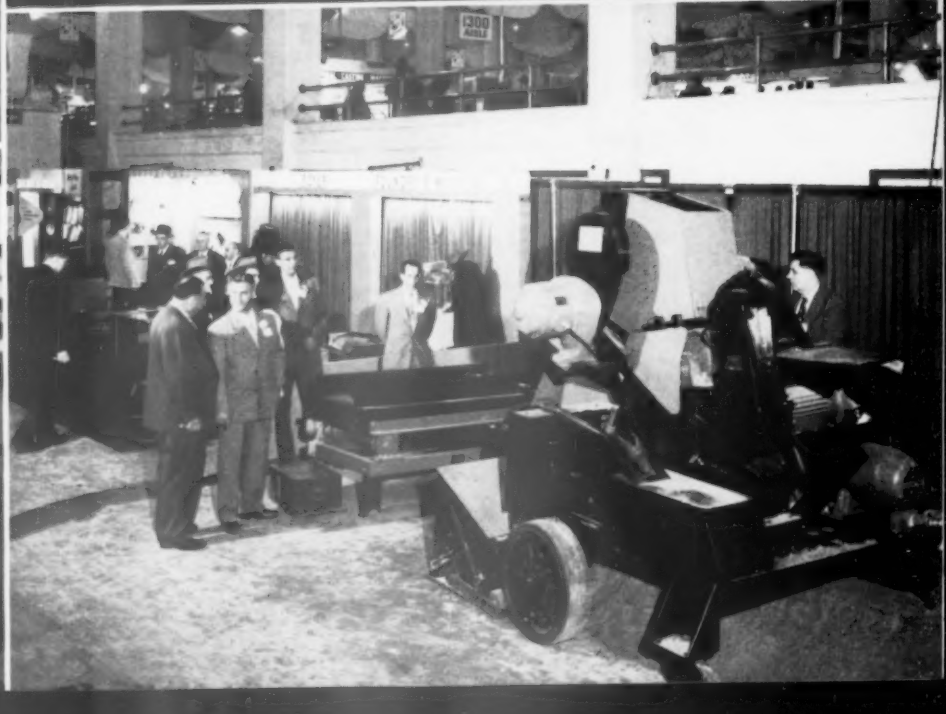


Fig. 1—Looking upward from base of water-cooled cupola. It incorporates six coolers of the type shown at right

This article describes work by engineers of Ford Motor Co. Ltd., Dagenham, England, in reducing cupola lining wear through adoption of water cooling to the melting zone; also in obtaining increased desulphurization by use of a basic lining

NEW CUPOLA DESIGN

Incorporates Water Cooling, Basic Lining

WHY do relatively simple ideas take years to emerge from their resting places? How often has the question been asked, when a new technical development has been achieved, "Why was it not thought of before?" A probable answer is that most people's minds tend to run along well worn grooves. It also takes a great deal of time, work and experience to apply an idea to a new set of conditions. These remarks aptly apply to some methods of cupola melting practice developed at the foundry of the Ford Motor Co. Ltd., Dagenham, Essex, England.

One of the latest developments is the adoption of a modified design of the melting zone of the cupola and of a system of water cooling applied to that portion of the furnace, with resulting reduction of lining wear and economy of refractory material. This system was described in a paper by E. S. Renshaw and S. J. Sargood, of Ford's Dagenham foundry, given before the London branch of the Institute of British Foundrymen and published in the institute's

official publication, the *Foundry Trade Journal*.

In recent years, during which the use of steel scrap in cupola charges has become a regular practice, while higher production and correspondingly longer periods of operation have become a necessity, the question of lining life has demanded more attention. Furthermore, when it is realized that a considerable proportion of the slag bulk created in the cupola arises from refractory consumed from the lining, the problem of operating a cupola with a slag of controlled composition becomes extremely difficult. A considerable proportion of the total refractory erosion occurs in the melting zone—the portion of the furnace wall extending some 2 or 3 ft above the tuyeres.

Ford foundry engineers have directed their attention, first to some modification of design of the melting zone portion of the cupola. Normal practice in the construction of a cupola is to maintain a parallel wall extending from the well to the charging door, or as an alternative, to "bosh" or flare out the lining at a certain distance above the tuyeres. It was decided to modify the construction of a cupola on the assumption that some improvement in refractory consumption might be effected if, at the maximum temperature zone, the wall above the tuyeres could be set back. In other words, it was proposed to construct an initial lining contour which would approximate to the normal erosion profile.

Details of Successive Changes

The first profile tried out is shown at Fig. 2A; it was found that erosion at the portion immediately above the tuyeres was appreciable, due to localized high temperatures, metal flow and slag attack. At the same time, however, by concentrating most of the erosion over a reduced area, a saving of 40 per cent in repair material was shown. The next stage was to replace the brickwork immediately above the tuyeres by a system of six water cooling segments, each segment or jacket being integral with an individual tuyere (Fig. 2B). The cupola was operated on production in this condition for some four months and it was found that, while refractory consumption was reduced to very small proportions, at some stage in the melting there was the danger of an odd stream of metal falling on a water cooler and causing local failure. Protecting the cooler face with a layer of refractory was found to be ineffective, as this protective layer was removed in the early stages of the melt. With this cooling system, operating temperature was lowered and necessitated increasing the coke consumption 10 to 15 per cent.

Work on a cooling system was temporarily suspended until a later stage, the next step being to increase the well diameter, thus eliminating the protruding ledge, as shown in Fig. 2C. The erosion was transferred to the normal location on the inclined face immediately above the tuyeres but proved to be considerably less than with the vertical wall. Over a period of six months' operation, a saving of 60 per cent of patching material was shown. At this stage, it was decided to revert to water cooling, using exposed plain-surface water jackets to replace the refractory on the inclined face to a height of 30 in. above the tuyeres (Fig. 2D). Although these coolers proved to be reliable since no damage from metal flow occurred, it was found that, to maintain normal tapping temperatures, only 50 per cent of the total melting zone area could be jacketed, because it was obviously undesirable to solve a refractory problem at the expense of thermal efficiency. Covering the cooler face with refractory again proved ineffective; using plain surface coolers, water cooling behind a refractory having a specific conductivity as low as ganister did not appear to be effective.

Consequently, as a major development, it was decided to install redesigned coolers with corrugations on the exposed face as described by Bamford in a paper given before the British Iron and Steel Research Association, and which had proved satisfactory with a parallel wall. This type, shown at right in Fig. 1, is made as a steel casting with the exception of the rear face which is a steel plate welded into position. The water inlet pipe, $\frac{3}{4}$-in. diameter, is extended to the base of the inside of the jacket to ensure circulation, and two outlets are utilized, one 2 in. diameter as a return to the system, and a second, also 2 in. diameter, fitted with an open section to act as a safety opening for steam release. Fig. 1, looking upward from the base of the cupola, shows six coolers in position to form the melting zone area. The advantage of this type of cooler is that the corrugations may be filled with ganister, most of which remains *in situ* throughout the melt. In practice, a water circulation of 2500 gallons per hour is sufficient for a cupola of 37 in. diameter at the stack, giving a rise in water temperature of 20° C from inlet to outlet.

In regard to thermal efficiency, it was found in

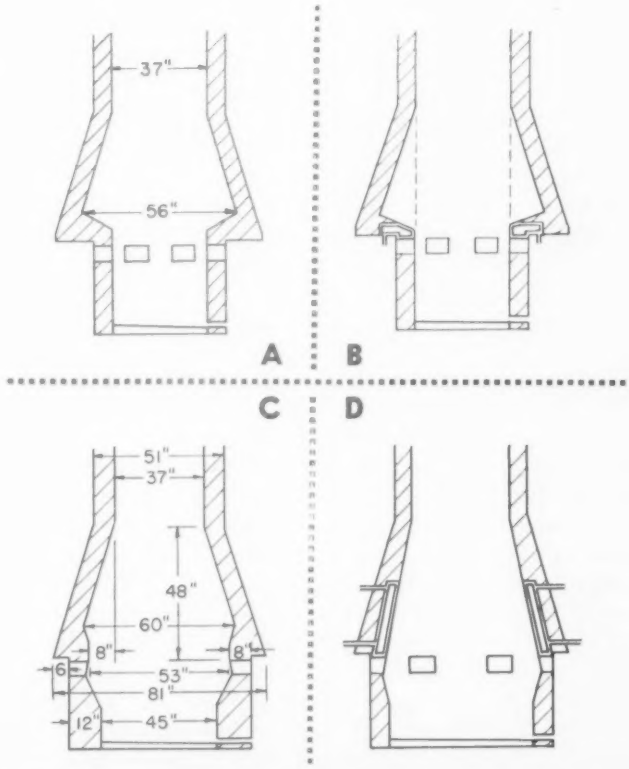


Fig. 2—Steps in developing the water-cooled cupola

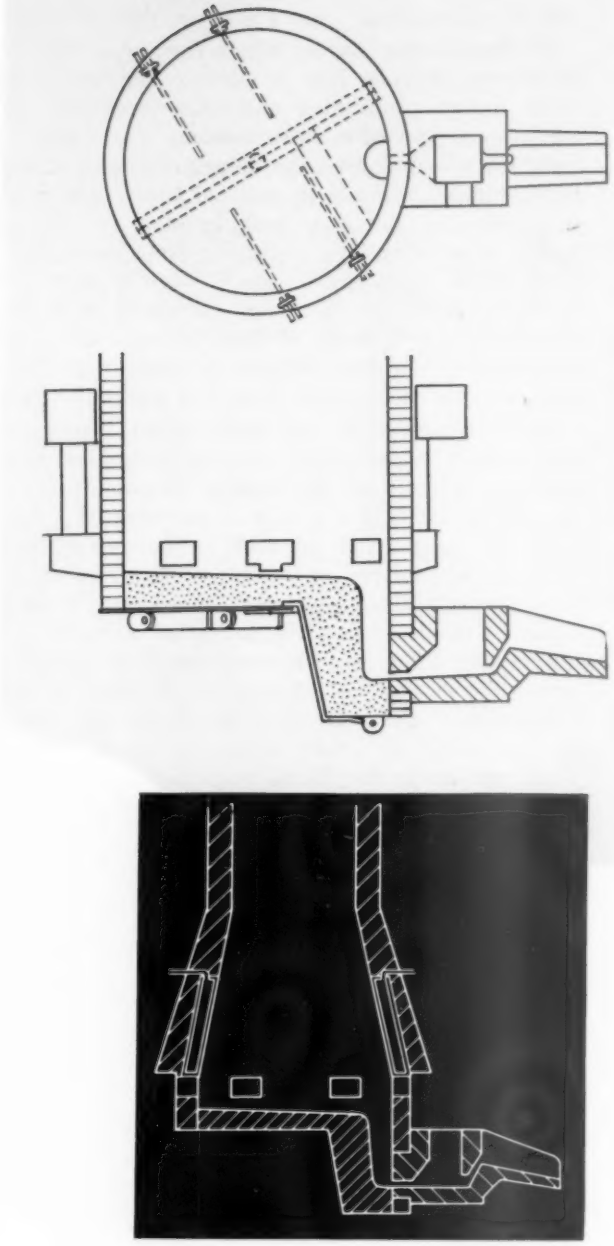
practice that the difference in the average temperature for an equivalent coke percentage with and without water cooling was no greater than 20°C. The relatively low heat loss is probably due to the insulating effect of the ganister remaining in the corrugations, and also to a layer of slag, approximately 3/16-in. thick, which is found to be deposited on the exposed surface and which remains throughout the melt. In addition to refractory saving, further advantages due to water cooling become self-evident, such as reduced labor repair charges, the possibility of operating multiple shifts or the use of a single cupola on consecutive days, thereby reducing installation costs.

Cupola Well Practically Eliminated

The refractory problem in the melting zone having been dealt with, attention was turned to the portion of the lining below this section. Work in this direction was not concerned initially with refractories, but more with cupola practice and thermal efficiency, although the changes have resulted in a further saving of refractories in this portion of the furnace. This method may be applied only to the continuous tapping cupola fitted with a receiver. The well, situated as it is below the combustion or melting zone, is not subjected to any direct heating, but derives its heat mainly from the molten slag and metal as they accumulate and pass through the tapping hole. The heat transfer from the molten products to the refractory lining in the furnace well is appreciable, particularly in the early stages of the melt and until the temperature of the inner face approaches that of the slag and metal. Even in the later stages of the melt, when temperature equilibrium has been reached, some degree of heat loss is inevitable.

With the continuous tapping cupola, it has been found possible virtually to eliminate the well, tapping the metal immediately on melting into the receiver. The construction of that portion of the furnace below the tuyeres which normally constitutes the well has been modified to enable the well proper to be replaced by a narrow channel. The molten slag and metal, on passing the tuyeres, are diverted immediately into the channel and out of the tapping hole into a slag-separating device. The column of slag maintained in the channel is sufficient to prevent the blast from escaping through the tapping hole and so enables the continuous tapping device to function in the usual manner. There is a considerable reduction in the surface area of refractory through which heat may be lost, the molten products being collected and conveyed from the furnace at their maximum temperatures.

In this design the drop bottom doors have been raised to a position 12 in. below the tuyeres, allowing for a sand depth of 6 to 8 in. and a box (fabricated from steel plate) to be fitted and secured in position by welding. This box is fitted with a door or flap, hinged at the base and flanged at the top, so that it is held in position by the drop-bottom door; on releasing the supporting prop, both doors and flap open and hang downwards. The front wall of the auxiliary box containing the tapping hole is lined with



refractory, the remainder of the channel being formed by molding sand rammed hard around a tapered former 6 in. wide. The bed of the furnace is arranged to slope toward the channel. The same purpose may be achieved, without the necessity for the structural alterations described, by raising the normal sand bed depth to within 4 to 6 in. of the tuyeres, the channel being formed as above. Fig. 4 shows the section of a water-cooled, well-less cupola with enlarged melting zone as described and as used in daily production at the Dagenham foundry.

The methods just described give excellent results on acid-lined cupolas and have enabled this foundry to utilize a blast furnace grade of coke (16 hours coking time) without loss of cupola efficiency. Previous precautions for preheating the cupola are now unnecessary and blowing may commence immediately the coke bed is ignited and charging completed. Normal coke-bed heights may be used, and it is possible

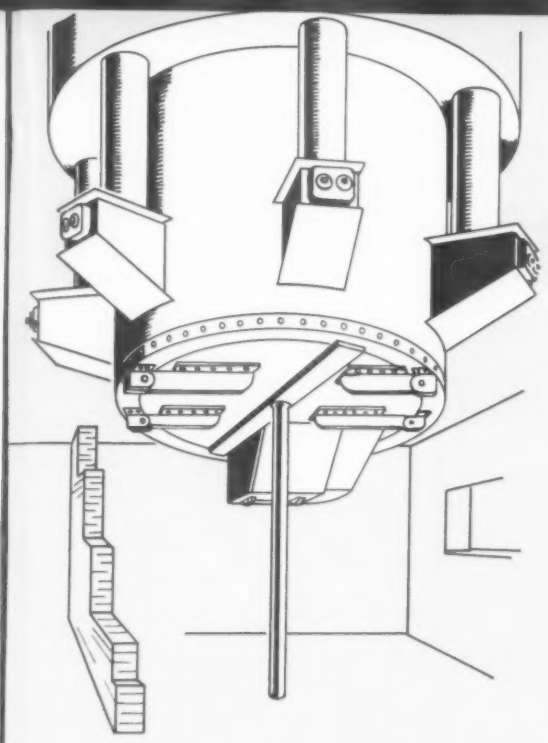


Fig. 3 (above)—Plan, sectional, and perspective exterior views of a well-less type cupola
Fig. 4 (left)—Water-cooled well-less type cupola

to obtain satisfactory tapping temperatures with a bed 26 in. above the tuyeres. Low coke-bed height is of considerable assistance in obtaining low initial sulphur pickup and carbon and silicon control of the first charges melted is more positive. In addition to an improved initial tapping temperature, the average temperature of the metal throughout the duration of the blow is appreciably higher.

The total area of exposed well refractory being low, a substantial economy of repair material ensues, and by utilizing a proprietary carbonaceous ramming material for the preparation of the tapping hole, a considerable improvement in its life is obtained over that of the rammed siliceous refractory previously employed. The carbonaceous preparation is heated to a low temperature to soften the binder and give the required plasticity, and on heating during operation the material forms a hard, dense mass of high compactness. In the region of the tap hole it is not subjected to oxidation during operation, the only loss being by comparatively slight solution. By eliminating refractories wherever possible, particularly in the vulnerable areas, the possibility of continuous operation is foreseen.

Much attention has been given to slag control, especially in connection with the use of the basic cupola. Interest in the use of water cooling has been considerably increased by the possibility of applying it to the basic cupola. In the early years of the war, E. S. Renshaw investigated the possibility of using a basic lining in the cupola, with a view to obtaining a greater degree of desulphurization with low-carbon irons. With a basic lining the product of fusion from the furnace walls would be basic, and possibly larger amounts of limestone could be added without causing erosion to the refractory as is the case in acid-lined furnaces. The results of Mr. Renshaw's investigations at that time were published in the *Foundry Trade Journal*, June 24, 1943.

When the process was first tried, a stabilized dolomite lining was employed both in the well and in the melting zone, the latter section being lined with the material to a height of 4 ft above the tuyeres. The stablized dolomite used was suitably ground and made into brick form or cement suitable for ramming or patching when mixed with water. A typical analysis is: Silica 14.4 per cent, ferric oxide 3.44 per cent, alumina 1.50 per cent, lime 40.04 per cent, magnesia 40.30 per cent, loss on ignition 0.25.

Use Dolomite Bricks in Lining

The furnace chosen for the experimental lining was a standard type, capable of melting 2 tons of metal per hour, with an external diameter of 36 in. and an internal diameter of 27 in. The previous firebrick was knocked out to a height of 3 ft 6 in. above the top tuyeres. Dolomite backing bricks, 9 x 4½ x 1 in., were placed against the shell, followed by 3½ in. of rammed material, thus giving a lining thickness of 4½ in. Stabilized dolomite cement mixed with 6 per cent water and 1 per cent sodium silicate was rammed round a suitable former to form the tuyeres. The finished lining was first air dried, followed by a gas flame, the temperature being increased gradually over a period of ten hours to about 400° C, after which the surface of the refractory was hard and compact. For further repairs to the melting zone after each melt, patching cement prepared by grinding stabilized dolomite clinker to a finer grading than the ramming material was used. This was milled with about 12 per cent water to give it sufficient plasticity for application. It must be applied immediately after mixing as the material possesses air setting properties.

The experimental cupola was fitted with a continuous tapping box, through which both the slag and metal are passed and separated, and this was rammed with the same material. The principle of this continuous tapping box consists of running both metal and slag through a single hole into the slagging box, which takes the form of a teapot spout ladle; a section of this device is seen in Fig. 4. As soon as tapping takes place, the iron fills the channels in the slagging box and rises (*Please turn to page* 193)

Casting DEFECTS

DEFECTS in castings are often caused by gases from cores trapped in the metal before it solidifies. When the pressure of the gases generated within a core exceeds the pressure produced by the liquid metal upon the core, the gases will penetrate the metal. Because these defects originate on the inside of the castings, in many instances they are not detected until after the castings have been machined or have been broken apart. Blow holes caused by gases from cores are most frequently found under bosses or at intersections of ribs on castings where the metal remains liquid for the longest time. These areas are known as "hot spots." As long as any metal in a mold remains in a liquid or soft state, gases from cores may be forced into it, unless other means of escape for the gases are provided.

When molten metal enters a mold having an internal core, the heat rapidly volatilizes any free or combined water present and then destroys the organic binder in the core. The heat radiated from or conducted by the molten metal first attacks the binder on or near the surface of the core. Fortunately, the heat conductivity of the core sand is relatively low; hence the binder on the inside of the core is decomposed less rapidly.

Core Gas May Pass Into Metal

As the metal is poured into a mold and gradually surrounds a core, the gases developed within the core may pass into the mold cavity and through the mold. But after the core is completely covered with metal, the gases can escape only through the vents or through the metal wall around the core. The pressure of the gas produced inside the core is of the same intensity at all areas of the core. If adequate vents are not provided for the rapid removal of the core gases, they will be forced into the metal at those locations where the resisting pressure of the metal is the lowest.

To aid in explaining those factors which contribute to the formation of gas holes in metal castings, an example is taken of a mold for a hemispherical casting. The cross sections of this mold are illustrated in Figs. 1 and 2. A core having a hemispherical shape is supported in this mold by a tube extending from the inside of the core to the outside of the mold. Attached to this tube is a pressure gage to indicate the gas pressures within the core.

Consider now the conditions which cause formation of gas pockets at location *L* in Fig. 1 This is the top of the core and the point of minimum pressure on it. After the core is completely surrounded by metal, the pressure within the core builds up as shown by the line *A-G* in Fig. 3. The slope of this line depends upon the temperature of the metal as well as upon the amount and type of organic binder in the core. The higher the temperature of the metal, the more rapidly will gases be generated from the core binders. Also, the greater the concentration of the organic binder at the surface of the core, the larger will be the volume of gas evolved. The relative amounts of gas produced from the different core binders will be (*Please turn to page* 210)

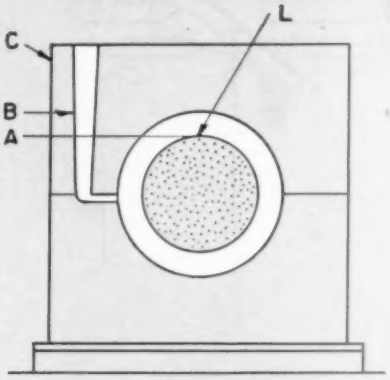


FIG. 1

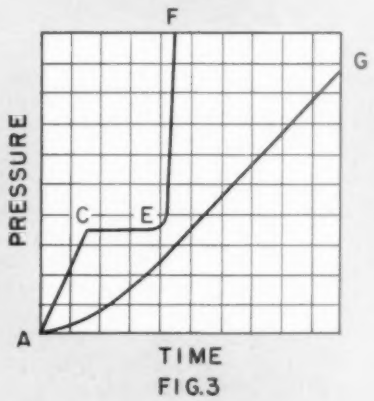


FIG.3

Figs. 1 and 2—Cross sections of a mold for a hemispherical casting. Tube supporing core has gage at end to indicate gas pressure within core

Fig. 7 (right)—Apparatus used in generating and measuring core binder gases

TABLE I—Gas from Cores

(Average volume of gas in cubic inches from one cubic inch of core for each pound of transverse strength)

Raw linseed oil (1 to 50 by vol)	0.26
Molasses (1 to 50 by vol)	0.33
Gelatinized starch (1 to 50 by wt)	0.56
Rosin (1 to 25 by wt)	1.08
Pitch (1 to 25 by wt)	1.13

By H. L. CAMPBELL
Metallurgcal Engineer
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Caused by CORE GASES

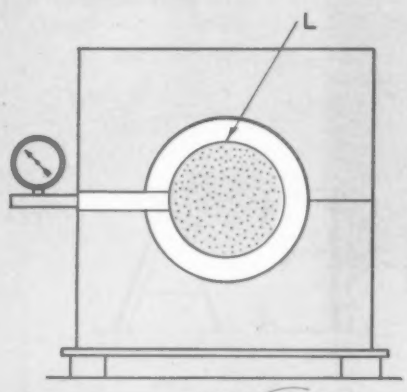


FIG. 2

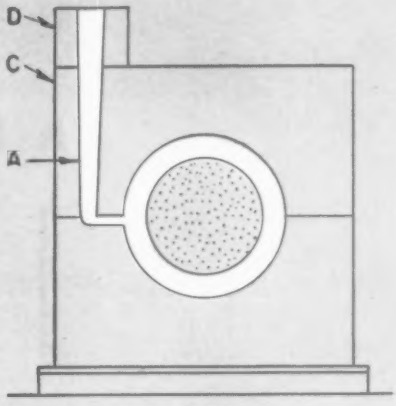


FIG. 5

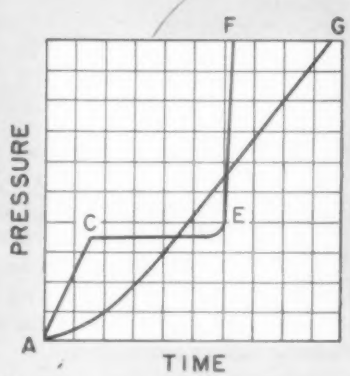


FIG. 4

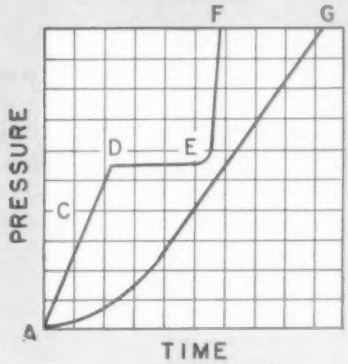
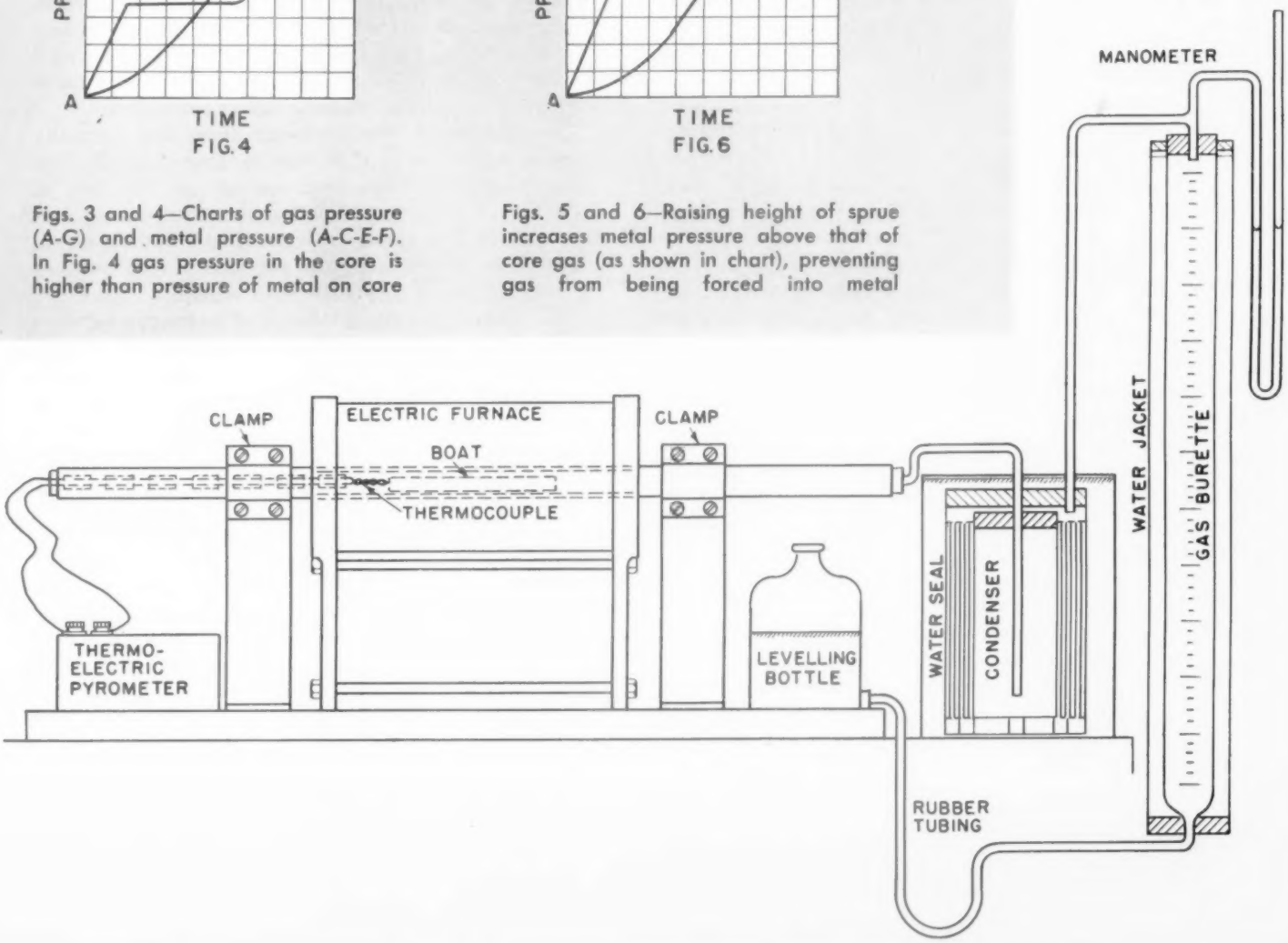


FIG. 6

Figs. 3 and 4—Charts of gas pressure (A-G) and metal pressure (A-C-E-F). In Fig. 4 gas pressure in the core is higher than pressure of metal on core

Figs. 5 and 6—Raising height of sprue increases metal pressure above that of core gas (as shown in chart), preventing gas from being forced into metal



GROWTH OF AN IDEA

By WILLIAM G. GUDE
Managing Editor
THE FOUNDRY

FIFTY years ago, Joseph Oppenheim, an Ohio country school teacher, had an idea. He thought it possible to build a machine that would take over the manual job of pitchforking manure onto the fields of his neighbors' farms—a laborious task which each year necessitated the services of many of his older pupils and their absence from school.

Mr. Oppenheim built his machine; it proved successful and another chapter of American industrial development was started. In the ensuing half century, the inventor's idea has matured into a major manufacturer of farm equipment, and through the years the company fittingly has retained the name of New Idea. With main offices and plant at Coldwater, O., and operating another plant at Sandwich, Ill., the company merged into the Avco Mfg. Corp. after the recent war and now is known as the New Idea Division of that organization. While the spreader still is one of the company's major products, it is supplemented by a number of other farm units, including corn pickers, field mowers, corn shellers, side delivery rakes, hay loaders, wagons, transplanters, portable elevators and service parts.

An important step in providing the most modern manufacturing facilities for the Coldwater plant was completed last year when the first metal was poured in New Idea's new gray iron foundry. An old foundry, formerly occupying space now taken over by other manufacturing departments, was replaced by a new and separate steel structure incorporating the latest types of production and materials handling equipment. One of the country's most up-to-date gray iron foundries is represented by the completed unit.

The main foundry building (Fig. 7) measuring 120 x 300 ft, is flanked by a 50 x 300 ft covered craneway encompassing storage bins for raw materials and a station for making up cupola charges. Maximum use is made of natural lighting by the adoption of windows for a major portion of the building's walls. Throughout the structure the use of welded H-section trusses and jack trusses, which can support suspended loads from any point, facilitated the installation of overhead materials handling conveyors.

Dust is conspicuously absent from the normally troublesome spots. This results from an effective exhaust system which removes air at the rate of 250,000 cfm from mold cooling tunnels, pouring stations, shakeouts, the sand system and casting cleaning department. Warmth is supplied in cold weather by space heaters furnished with steam.

The foundry makes a variety of castings; between 700 and 800 different patterns—nearly all of which are matchplates—are in use and in storage. Castings range from ½ to 90 lb in weight, but most of the production is in small parts and the average of all castings is about 5 lb. Total output is more than 50 tons of finished castings daily.

Molds are made on three lines. Two of these, known as the A and B lines, are for castings weighing approximately 30 lb and under, and each is served by a separate power mold conveyor. The lines, paralleling each other as shown in Figs. 1 and 2, have a total of 36 molding stations equipped principally with small jolt-squeeze machines. To handle somewhat larger molds, however, four of the stations have separate cope or drag units. Molds are made in snap flasks, and cores are obtained from racks located alongside each machine operator. These racks are filled with a day's requirements before work is started. Sand is fed from individual overhead hoppers, each equipped with a vibrator.

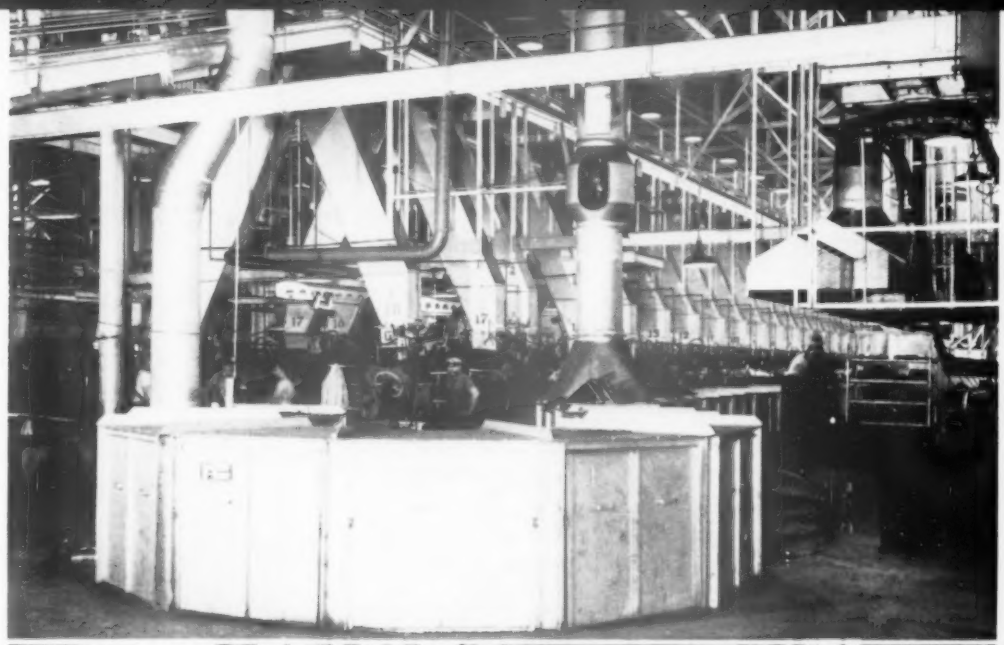


Fig. 1—General view of two molding lines and hooded conveyor

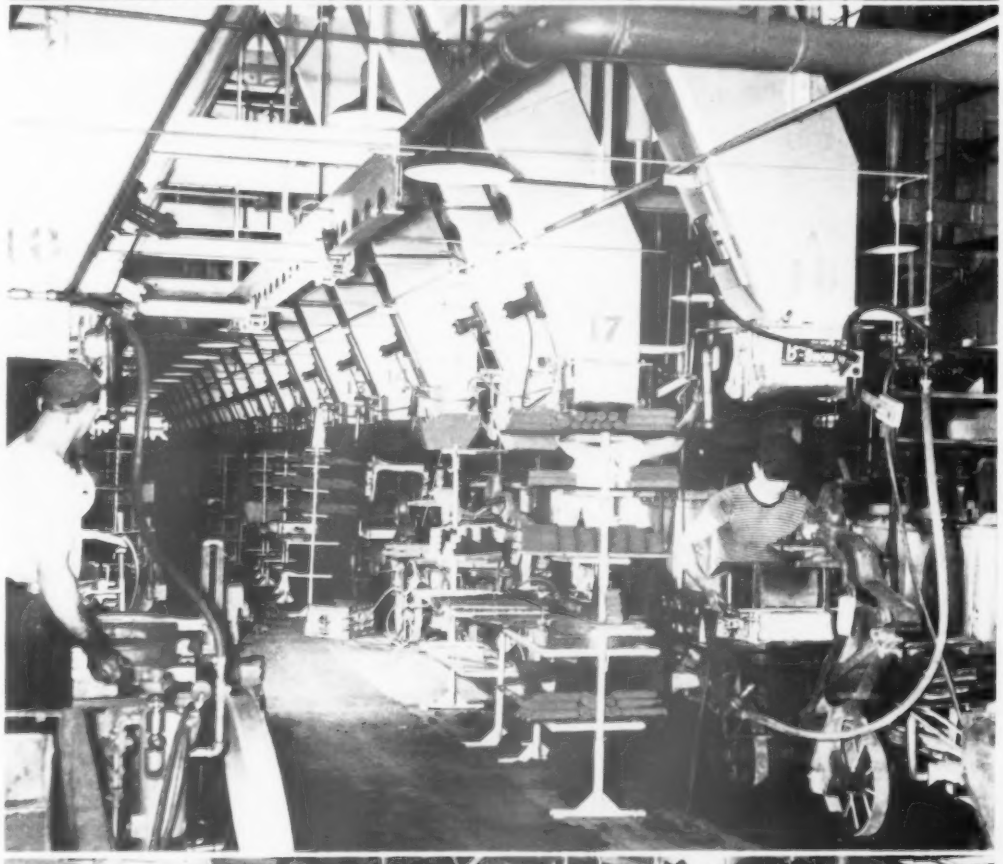


Fig. 2 — Each molding line is equipped with 18 molding stations

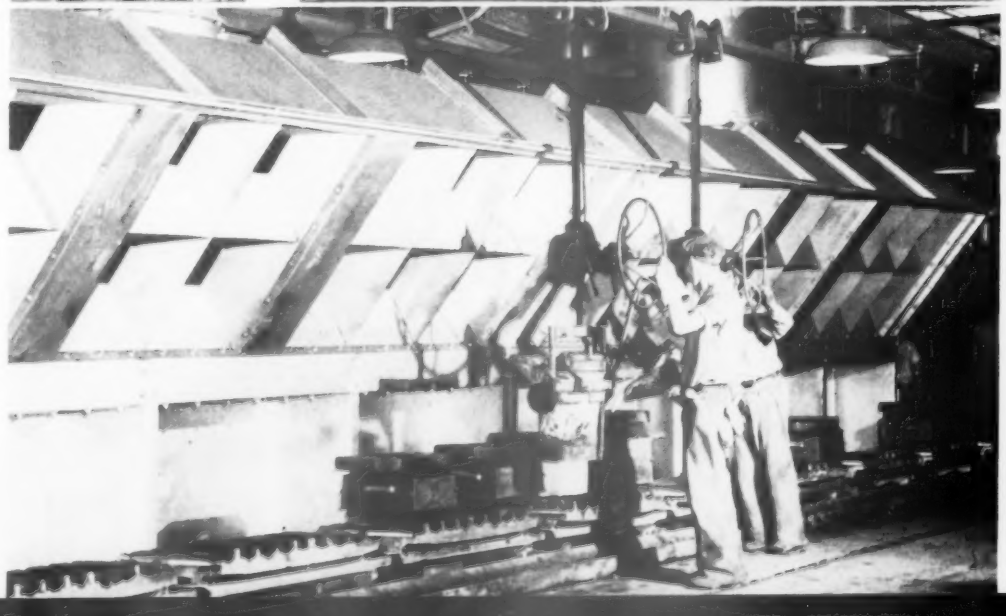


Fig. 3 — Pouring station is provided with effective exhaust

Mold conveyors for these two lines travel at about 22 feet per minute. Molds are jacketed and weighted before arriving at the pouring station (Fig. 3) where an exhaust hood efficiently removes smoke and fumes. After jackets and weights are removed, the poured molds enter a cooling tunnel and in about nine minutes arrive at a shakeout. Here the conveyor cars are automatically tipped by a cam and the molds dumped to an under-floor shakeout. Bottom boards remain on the cars. Recovered sand is returned by belt conveyor to the sand system and the castings are removed by apron conveyor to the cleaning department.

The third or C molding line handles the largest castings. It consists of a four-station, 16-ft-diam turntable serviced by a stationary sandslinger (Figs. 4 and 5) and also is provided a power mold conveyor. Molds are rammed in tight flasks. Six operators are employed at the turntable—one to locate the flasks on the draw machines, two to operate these machines and place the molds on the conveyor cars, two to set cores, and one to operate the slinger.

The slinger line conveyor travels at 4½ feet per minute and gives the castings a cooling period after pouring of 45 to 50 minutes. As in the case of the other two lines, the pouring station and cooling tunnel are equipped with an exhaust system. Immediately upon leaving the tunnel the molds are picked up by a hoist and placed on a vibrating shakeout table (Fig. 6). The empty flasks subsequently are returned to the conveyor for the trip back to the molding turntable.

Among the principal castings made on the slinger line are rolls for corn pickers, and large gear cases. The rolls are of two types: Snapping rolls, which operate on a machine in pairs and have spiral ribs revolving toward each other for the purpose of snapping off the ears from the corn stalks; and husking rolls, which operate in pairs similar to a wringer and which have small pegs to strip the husks from the ears as they are moved over the rolls. These rolls, weighing about 40 lb when finished, are molded four to a flask. The molds measure 58 x 24 x 12 in. and are produced at the rate of approximately 30 per hour.

A wide variety of cores are required. Most of them are made at 12 benches, although three blowers also are used for making certain cores, principally the long roll cores. Coremaking stations are located on either side of a belt conveyor (Fig. 11). The green cores, placed on plates or driers, are moved on this belt to a continuous tower type oven for baking. Finished cores are sprayed, inspected and stored on racks awaiting use.

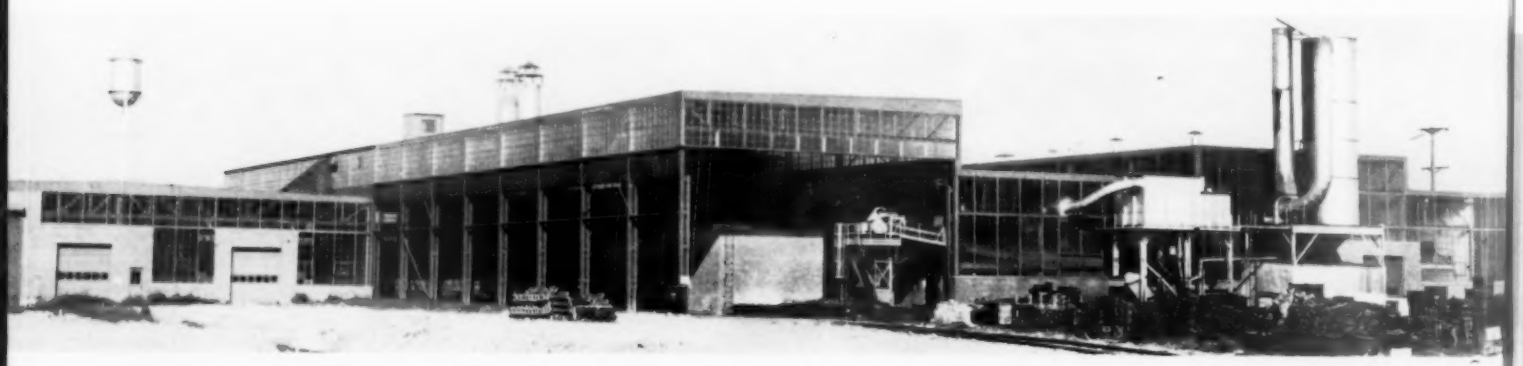
Core sand is drawn from concrete storage bins in the raw materials yard via conveyor belt and passed first through an automatic, continuous type dryer before being dropped into a storage hopper. From there it is discharged as required into a muller for mixing with oil, clay bond and water. From the muller the sand mixture is conveyed to coremaking stations in tote boxes by monorail.

The same base lake sand is used for the synthetic molding sand mixture. What new sand is required is fed by vibrating feeder to a belt conveyor for delivery to the 150-ton capacity twin storage bin located above two 2000-lb capacity mullers. Shakeout sand and spill sand from the various molding lines also is returned to the storage bin after first being screened. Sand is mixed at the rate of 500 to 525 batches in an 8-hour day and is carried to molding stations by a main distribution belt. Plows divert the sand to individual molders' hoppers and to a feeder belt supplying the sandslinger.

The molding sand mixture of lake sand, southern bentonite and seacoal has approximately this analysis: Moisture 3 to 4 per cent, permeability 95 to 110, green compression strength 10 to 12 psi and flowability 75 to 85.

An unusually neat, light and well arranged cleaning room is provided. Fig. 12 shows part of the section devoted to cleaning small castings. It is located on a mezzanine floor at one end of the foundry. Castings are received here by an apron conveyor and discharged onto a sorting conveyor. Operators stationed along the latter conveyor sort the castings into tote boxes, the remaining scrap being collected at the end of the line. The filled tote boxes are picked up by a hoist and their contents packed into one or more of the seven tumbling barrels (Fig. 13) available on this floor for casting cleaning. Tumbled castings are dispatched through chutes to the floor below where five double stand grinders are used for removing gates, fins, etc. In this latter area three more tumblers are operated to clean the larger castings received in tote boxes from the large shakeout.

Melting facilities consist of two cupolas lined to 54-in. diam and melting 10 to 12 tons an hour. The cupolas, operated on alternate days, are the front slagging type, and are tapped continuously into a 3000-lb capacity holding ladle (Fig. 8) at about 2750 to 2800° F. Slag is discharged into a water



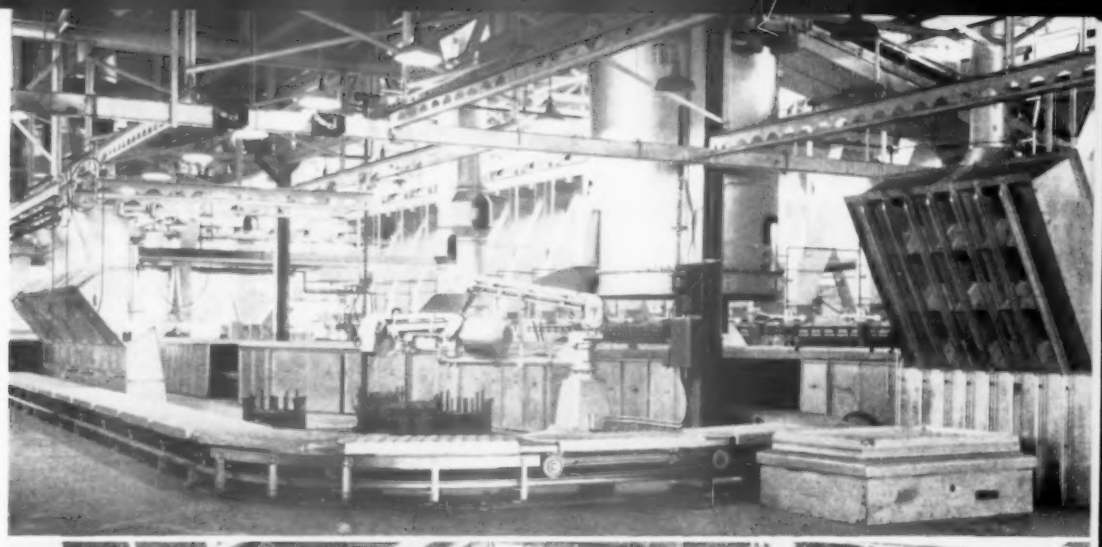


Fig. 4—Showing conveyor, pouring station and shake-out of large casting line

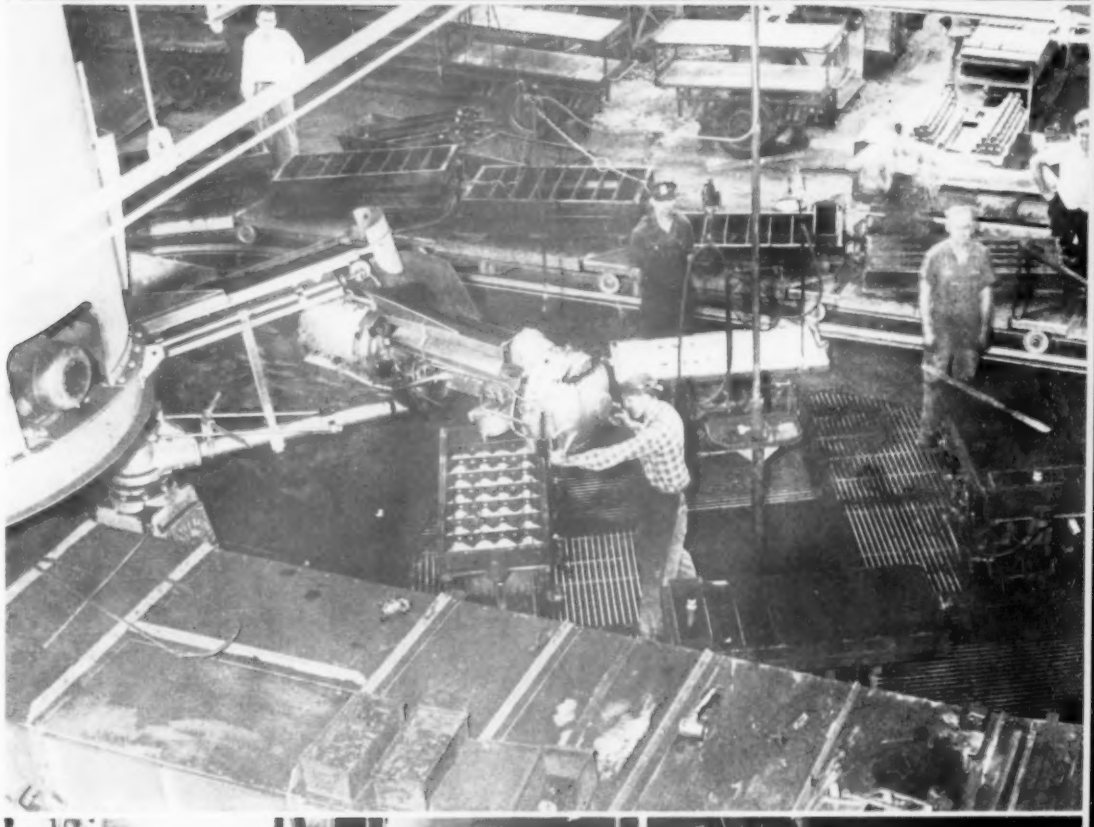


Fig. 5—Larger molds are rammed by a sand-slinger at four-station turntable

Fig. 6—Cooled molds are picked off line by hoist and placed on shakeout

Fig. 7 — Gray iron foundry of New Idea Division, Avco Mfg. Corp., Coldwater, O.

Fig. 8 (right)—Cupolas are of front slagging type and are tapped continuously into holding ladle

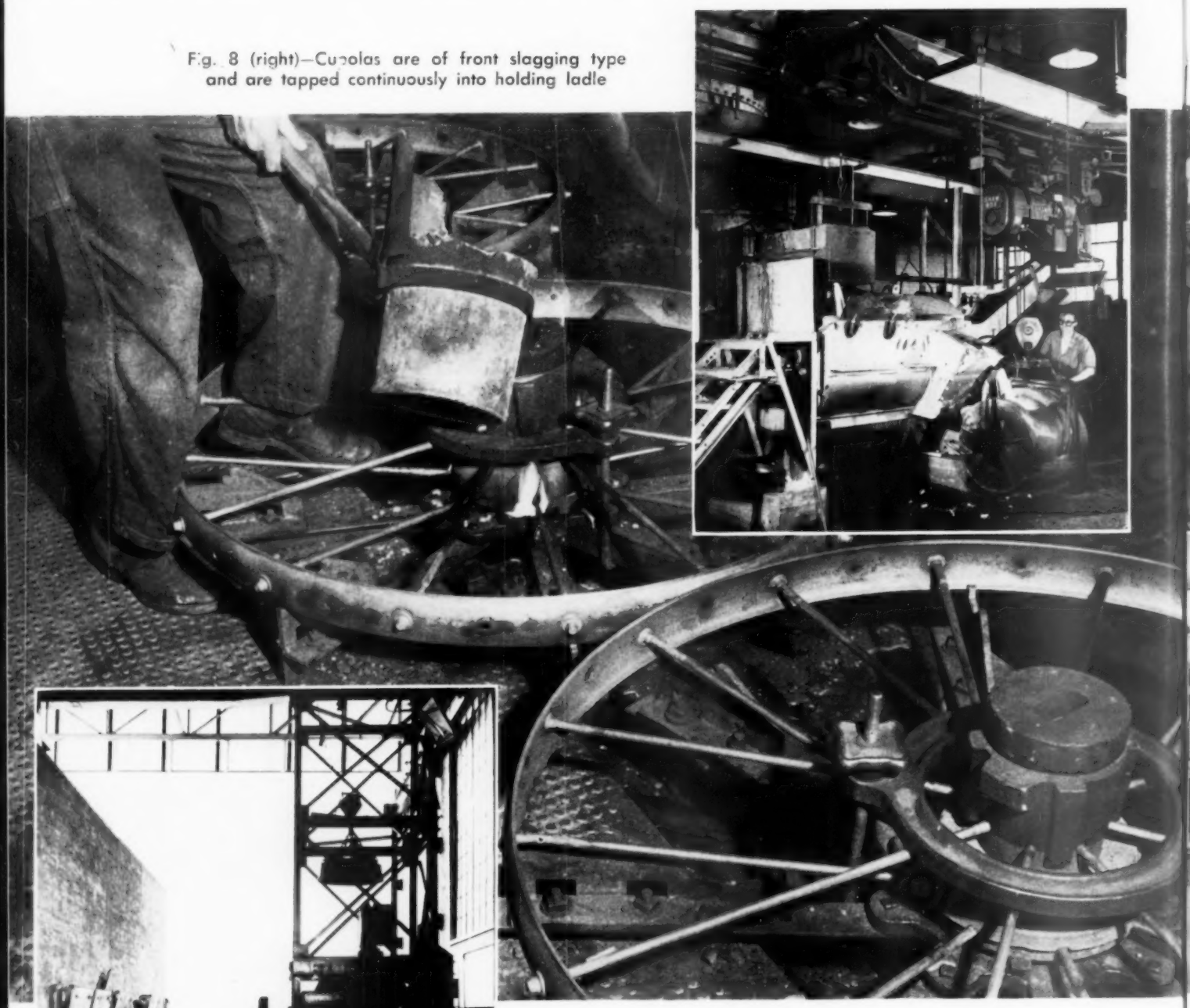


Fig. 9 (above)—Pouring hub on metal wheel line. Fixtures provide a chill mold into which sand core is placed

Fig. 10 (left)—Cupola charging bucket is loaded with metal from weigh hopper attached to a bridge crane

tank and recovered by a continuously operated chain conveyor. Insulated bull ladles of 1500 lb capacity, as shown in Fig. 8, travel by monorail to carry hot metal from the cupolas to the pouring stations. Larger molds are poured directly from this ladle; for the smaller castings the metal is transferred to 200-lb capacity ladles for pouring.

Cupola charges are made up in the yard extending along one side of the foundry where coke, pig iron and scrap—in addition to sand—are stored in concrete bins. Charging bucket is the square, four-leaf, orange-peel type, and is loaded with metal from a weigh hopper attached to a magnet-equipped bridge crane (Fig. 10). The bucket is handled by a skip-hoist charger. All coke is hand forked into a wheelbarrow before being dumped into the charging bucket.

Metal charges consist of approximately 30 per cent pig iron, 13 to 14 per cent steel scrap and the balance home and purchased iron scrap.

One of the interesting casting operations performed at the New Idea plant is the pouring of hubs (Fig. 9) for the many metal wheels required by various types of implements manufactured. Continuous production of these wheels is set up on an efficient basis, in an area paralleling the foundry mold-

Fig. 11—Belt conveyor carries cores from benches to oven for baking. Three blowers also are used

Fig. 12—This section of the cleaning room is located on a mezzanine. Castings reach here by conveyor

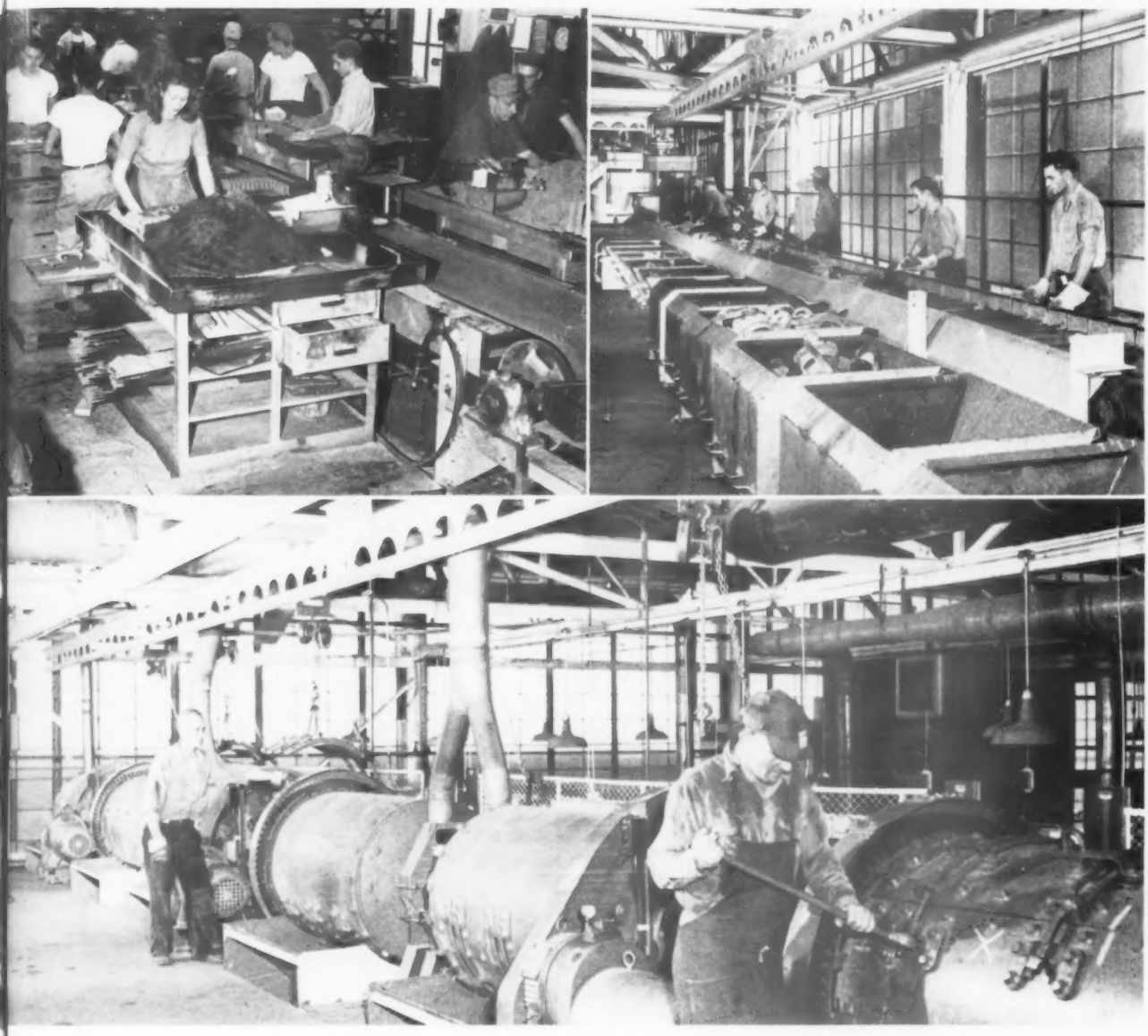


Fig. 13—Seven tumbling barrels in this department clean smaller castings

ing floors. An overhead monorail conveyor carries the pieces from their initial stages of fabrication to the finished product.

Strip steel, after being cut to size, punched for spokes and formed, is then butt welded to become the wheel rim. Next the steel spokes are inserted and forged in place on the rim, and the part moves to the hub pouring line where 36 fixtures of the type shown in Fig. 9 are located. Here the hubless wheel is removed from the conveyor and placed on a fixture and clamped in position as indicated. These fixtures provide a chill mold into which a core is placed for the wheel bore. Iron is poured by small hand ladle into the mold, and the solidified hub places the spokes under tension to provide a rigid assembly. After cleaning and machining the completed wheel is placed on another conveyor, which subsequently travels into and out of a dip tank and finally delivers the painted wheel to a storage department.

The good housekeeping so obvious throughout the foundry is the result of strict adherence to a program of cleanliness with respect to materials and equipment. Similar attention is paid to a program based on the belief that regular preventive maintenance can prevent major costly breakdowns. Specific policy likewise is followed to maintain casting quality. This applies not only to regular checking of metal and sand properties during the course of production, but also to a study of defective castings. Parts rejected at final inspection are carefully classified each day on conveniently located shelves and later are anlyzed by department heads to determine the cause of the trouble and how to correct it.

Sources of Illustrations

Figs. 1, 7—The Austin Co., Cleveland.
Figs. 2, 3, 8, 12, 13—New Idea Division, Avco Mfg. Corp., Coldwater, O.
Figs. 4, 5, 6, 9, 11—Beardsley & Piper Division of Pettibone Mulliken Corp., Chicago.
Fig. 10—Modern Equipment Co., Port Washington, Wis.

Continuing his discussion of gating and risering considerations in production of tin bronze castings, the author describes in this second article the influence of gate location and tapered sections on internal soundness of the cast metal

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Bureau of Ships
Department of the Navy
Washington

GATING AND RISERING TIN BRONZE C

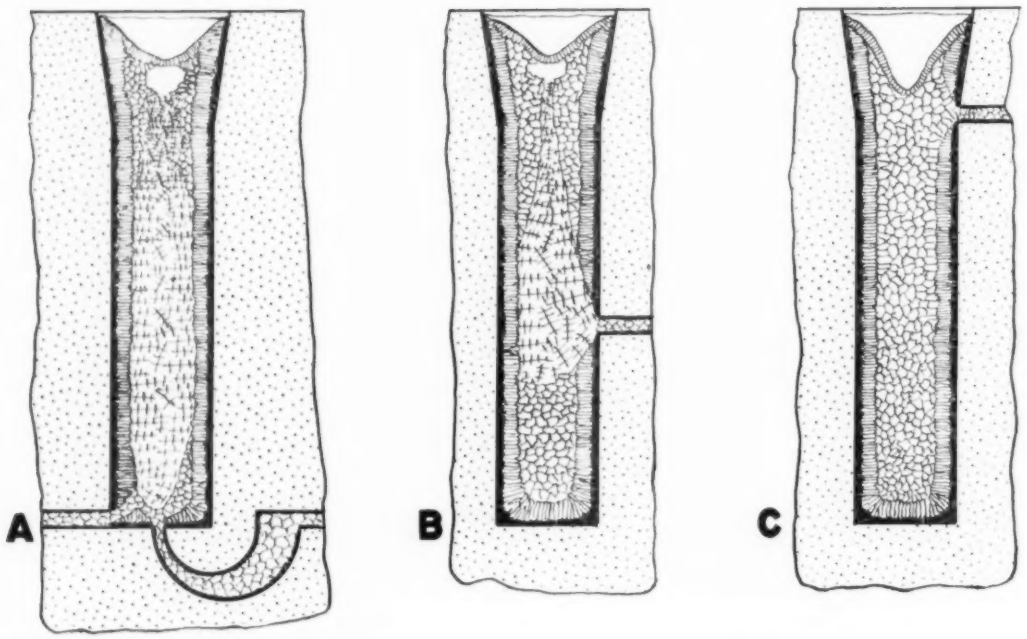


Fig. 4—Effect of gate location on internal soundness. A: Bottom or horn gating. B: Middle or parting line gating. C: Top gating

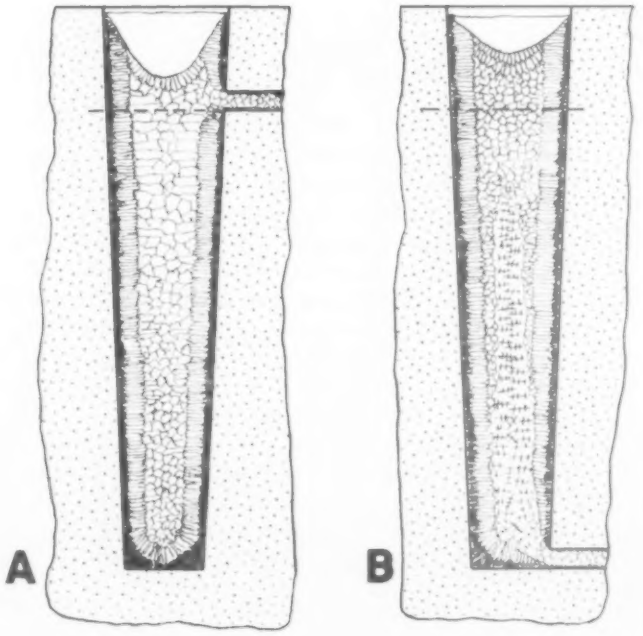


Fig. 5—Solidification in tapered sections. A: Regular taper, top gated. B: Regular taper, bottom gated. C: Reversed taper, top gated. D: Reversed taper, bottom gated

FIG. 4 illustrates methods of gating simple rectangular molds and the effect of such gating on the soundness of the casting. Each mold illustrated is furnished with a standard riser, open to the atmosphere, to provide final feeding at the top of the casting. It should be borne in mind that, as the metal is poured into the mold it begins to cool and, generally, the metal which enters first soon becomes considerably cooler than that entering later. The final metal which enters should be the hottest.

Fig. 4A shows the use of a regular bottom gate or a horn gate, here being used once more to cast the metal brick considered in last month's article.

E CASTINGS

Although both types of gate are shown, only one would be used to pour any single casting, but the effect of either would be approximately the same. As the hot metal enters the mold cavity, it heats the gate or runner, becoming cooler itself in the process. As the metal rises in the mold, it gives up more and more of its heat to the mold, thus becoming still cooler. The metal which has risen into the riser will be very near its freezing point and the last to enter at the bottom will be hottest. Freezing will begin at the top, causing the riser to freeze over entirely, with a very shallow shrinkage indentation.

It is probable also that a small amount of secondary shrinkage will occur just under the skin on the riser. As the hottest metal is at the bottom, the casting will solidify from the top down. Because of the liquid-solid shrinkage, the metal will tend to drain down from among the dendrites, leaving no more liquid to feed them. Therefore, shrinkage will start at the top of the casting, probably immediately under the riser skin. Because of the rapid growth of the dendrites further down, drainage and consequent feeding of the lower part will not be complete. The result of the complete solidification process will be that shrinkage will extend throughout the casting and will probably be heaviest near the bottom which is the last to freeze. In the illustration, shrinkage areas are indicated by skeleton dendrites and solid metal by either columnar or equiaxed grains.

When gating at the middle of the casting, as is fairly general when parting line gating is used, the first metal to enter the mold will flow to the bottom and, being coolest at this point, it will begin to solidify. As the metal immediately above is hotter, correct directional solidification will be set up in this part of the mold. This advantageous condition will cease as soon as the level of the metal reaches the gate. From here on, the metal will remain hottest at the gate and become continuously cooler from this point up. Above the gate then, the conditions will be similar to those in Fig. 1A. Shrinkage is almost certain to be present behind the gate and will probably extend to the top of the casting.

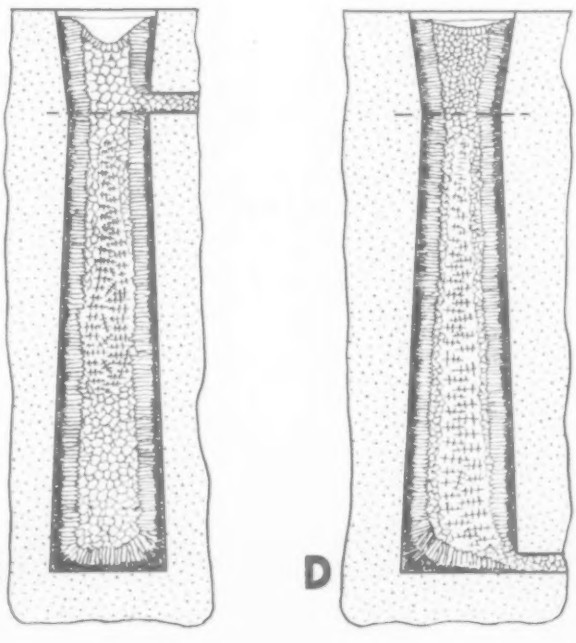
It is fortunate that, the conditions shown in Fig. 4B are not absolutely hopeless, because many types of castings, chiefly valves and fittings, almost always require being gated at the parting line. True, one can usually find traces of shrinkage behind the gate in such castings, but there are methods of eliminating or at least keeping this shrinkage to a minimum. Such methods should become evident later in the discussion.

Casting Free From Shrinkage

In Fig. 4C, the metal enters the mold at the bottom of the riser. With this arrangement, the coldest metal will be at the bottom and the hottest metal at the top. Solidification will begin at the bottom and proceed upward, all solidified metal having liquid metal above to feed it. If the metal has been poured slowly and at the correct temperature, the casting should be free from shrinkage, especially if the riser is kept open to the atmosphere until the casting is entirely solidified. The only improvement in this last method would possibly be to eliminate the gate entirely and pour the metal slowly down the riser, thus placing the hottest metal right on the surface of the riser where it would be less likely to set up quickly through cooling by the atmosphere.

A study of Fig. 4 should show that the best way to pour any casting is from the top and thus automatically gain the benefit of directional solidification. Bottom pouring is the worst possible method for a casting with vertical, uniform section walls as this will produce the most disadvantageous thermal gradients within the mold cavity.

Although all discussion offered so far has dealt with vertical sections, the same rules apply to horizontal sections and to those cast at an angle. They will also apply to circular and other curved sections. Horizontal sections are probably the most difficult to cast and to feed successfully. If such sections are raised at an angle and poured on a slight slant with the metal running (*Please turn to page* 213)



Mechanical Testing and Properties of GRAY I

EVALUATION of gray iron castings by testing is difficult, principally because the test values ordinarily obtained often bear little relation to the properties which confer serviceability in the casting. Also, the test values obtained from separately cast test bars are an uncertain indication of the properties of the metal in the casting. However, as the mechanical properties of cast iron and the correlations between properties and structures are better understood, logical specification of values to insure serviceability becomes more feasible.

Tensile Tests—ASTM A-48, the general specification for gray iron castings, divides irons into classes based on tensile strength. The test bars are separately cast in three standard diameters to allow matching of section size between test bar and casting. Fig. 1 shows typical test results for three classes of irons in the three standard bar sizes plus a smaller and a larger bar added to better delineate the trend. Tensile strength typically decreases with increasing section size and also is lowered by increase of carbon, silicon, and phosphorus content.

Fig. 2 shows similar tests on a low-carbon, high-silicon iron which shows little change in strength with changing section size. As section size increases, the combined carbon tends to decrease, the cell size increases, and pearlite becomes coarser. These effects cause the matrix to become weaker as section size increases. However, with an iron that is sensitive to undercooling there is a tendency to form the undesirable Type D graphite in the smaller bars where undercooling is most severe. This effect tends to cause strengthening due to better graphite distribution as section size increases. Therefore, increasing section size causes the matrix to become weaker but may cause the graphite distribution to become more favorable for high strength. Fig. 2 illustrates the fact that these two opposing effects in certain irons may be so nearly compensating that there is little effect of changing section size on tensile strength.

Inoculation (ladle addition of a graphitizer), is often used to eliminate or reduce the undesirable Type D graphite. The high strength iron of Fig. 1 was inoculated with ferrosilicon so that Type D graphite did not form in the smaller bars. The iron in Fig. 2 was not inoculated. It is apparent that inoculation largely eliminates the variable of graphite distribution, thus making the strength more consistent and

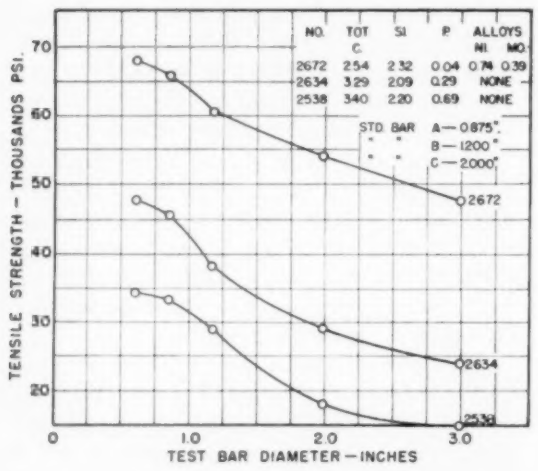


Fig. 1—Chart showing variation of tensile strength with diameter of gray cast iron test bar

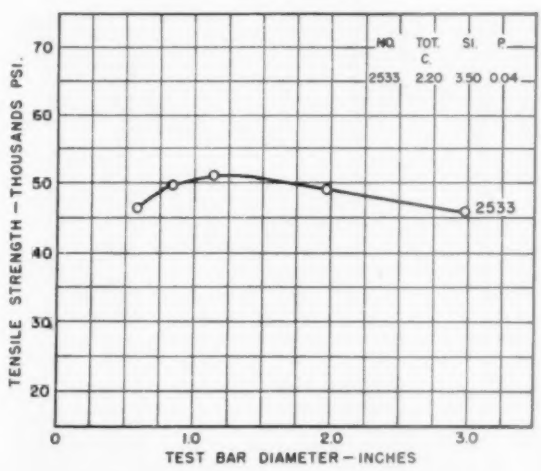


Fig. 2—Variation of tensile strength with test bar diameter for a low-carbon iron, not inoculated

Commonly used mechanical tests for cast iron, including nodular graphite iron, are described here in light of their usefulness and meaning. Some new test data on section size effect also are presented. This paper was presented at the Pacific Area national meeting of the American Society for Testing Materials, Oct. 10-14, 1949

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Y IRON

predictable at least to a fairly approximate extent.

In ASTM A-48 specification the dimensions of the tensile specimens to be machined from each of the standard bar sizes are specified. However, the question often arises as to the effect of diameter of the tensile specimen machined from a larger cast section. Fig. 3 shows tests on tensile specimens varying in diameter from ¼-in. to 1.875 in., but all machined from the center of 3-in.-diameter bars. It is rather surprising that in most cases small specimens from the very center of the bar are equal in strength to the larger specimens. Schneidewind[1] previously has shown this to be true for test bars cast in metal molds and annealed.

Transverse Test—In specification A-48 transverse tests are optional, and this test is often used by agreement in lieu of the tensile test to qualify an iron in its specified class. The transverse test is usually made on the as-cast bar and emphasizes the structure and surface of the cast skin. An advantage of the transverse test is that strain measurements (deflection) are made more easily than in the tensile test. It has been pointed out,[2, 3, 4] however, that substantial errors in transverse strain measurement are not uncommon, and that care must be taken to avoid measuring falsely excessive deflection. Fig. 4 shows transverse strengths, calculated to modulus of rupture, for the four irons of Figs. 1, 2 and 3.

Hardness Tests—The brinell test is the most commonly used test to measure hardness of cast iron. Since the surface hardness of a cast iron test bar may be considerably different from the hardness at the center, one point to be clarified is—what is the average hardness of a given cast iron test bar? One frequently used convention is to read the hardness on an impression made on a flat ground just through the threads of the standard machined tensile bar. This is at about half-way between surface and center of the as-cast bar. Others have used an average of the center, quarter, and surface hardness readings. Fig. 7 shows average hardnesses by the latter method for the four irons shown previously. Note the irregularity in the smaller bars cast from the un-inoculated low carbon iron No. 2533.

Impact Tests—There is no single standard method for rating the impact strength of cast iron. At least three different tests are used to some extent. An Izod type test was developed in England. This test

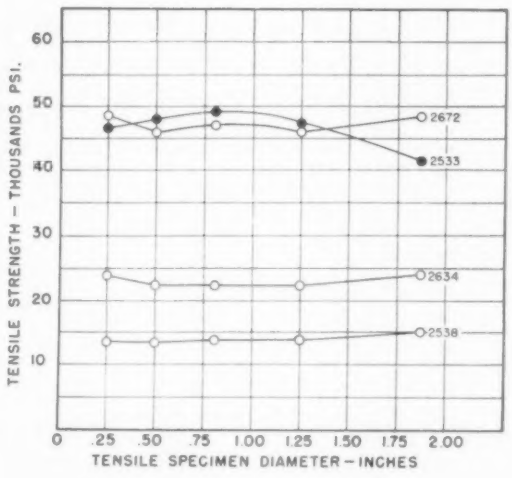

Fig. 3—Effect of diameter of tensile specimen machined from center of 3-in.-diameter test bars

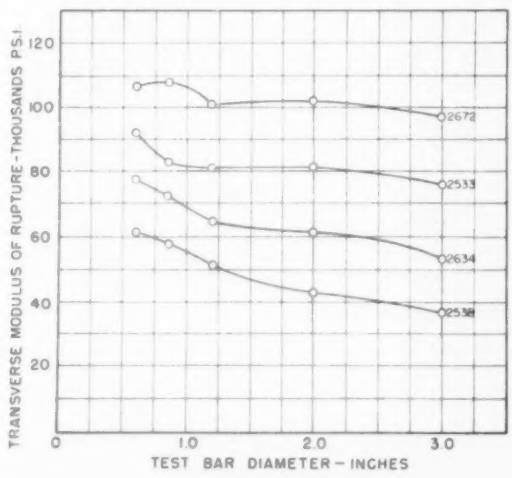

Fig. 4—Illustrating how transverse modulus of rupture varies with diameter of the test bar

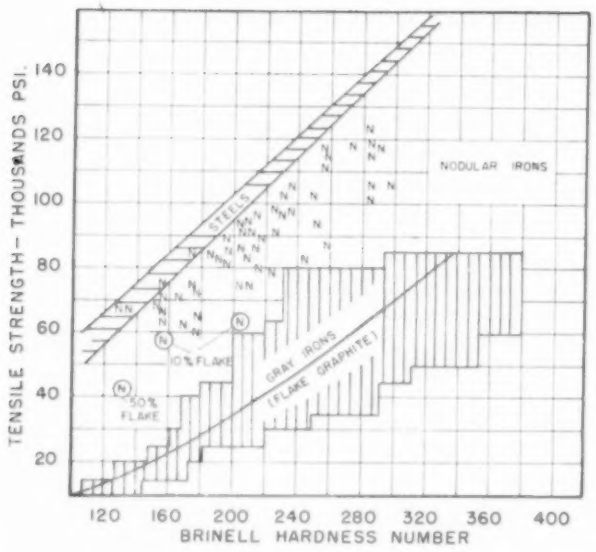

Fig. 5—Relationship between tensile strength and brinell hardness of gray iron, nodular iron and steel

TABLE I—Tensile Properties of Nodular Iron

(Tests on .505-in.-diam tensile specimens from keel block specimen and from 1.20-in.-diam round bar—not annealed)

		TS, psi.	YP psi.	El, %	Bhn	Remarks
(A)—Specimens from keel block coupon	(1)	92,000	60,000	9.4	180	
	(2)	93,500	60,000	8.1	186	
(B)—Specimens from A-48 bar B	(1)	58,300	48,000	0.8	187	Centerline shrinkage
	(2)	61,300	48,000	1.8	187	Centerline shrinkage

	T C	Si	S	Mn	P	Mg
Analysis	3.70	2.58	.028	.41	.04	.05

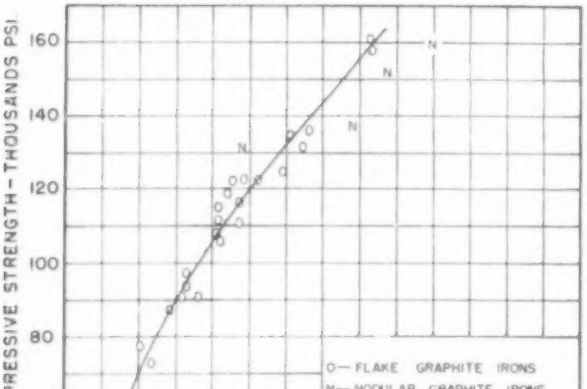

Fig. 6—Relation of compressive strength to hardness

uses a cylindrical specimen 0.798-in. diameter and 3 in. long which is tightly gripped at one end and broken as a cantilever by a single blow in a pendulum type impact machine. A Charpy type test is used by the Caterpillar Tractor Co. and others. This specimen is a machined or ground cylinder 1⅛ in. diameter and 8 in. long which is broken as a simple beam on 6 in. span by a single blow in a pendulum type impact machine. A third type is the Acipco Drop test which is described in the 1933 Report[5] of ASTM Sub-committee XV of A-3 on Impact Testing of Cast Iron. This test differs from the first two in that it is a repeated blow test which measures the energy required to break the specimen after most of the plastic deformation has occurred. The drop test may be performed on the A-48 standard bars *A*, *B*, and *C* in the as-cast condition. For the *B* bar (1.20 in. diameter) a 6-in. span and a 25-lb hammer are used. First drop is from 2-in. vertical height and succeeding drops at 1-in. increments to failure. This test has been adapted for pendulum type machines also.

Correlations Between Test Values—Since hardness is one of the easier tests and usually is not destructive, it is most valuable to develop the correlation between Brinell hardness and other properties. In steels the ordinarily determined tensile strength correlates well with brinell hardness so that tables are given showing the approximate tensile strength for each hardness range for carbon and low alloy steels. In cast irons the hardness—tensile strength relation

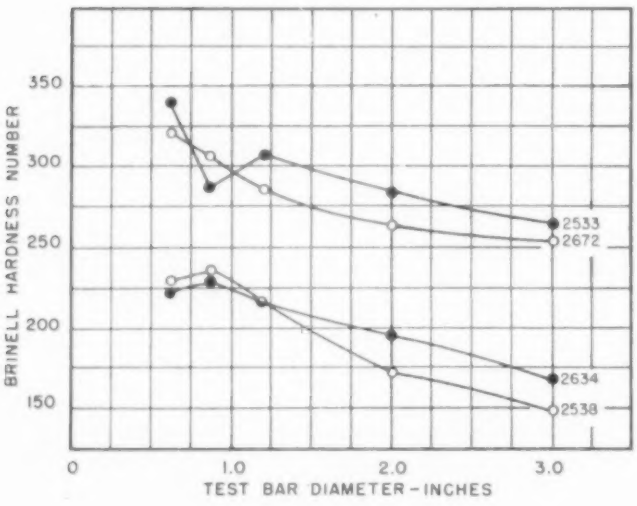

Fig. 7—Variction of hardness with test bar diameter

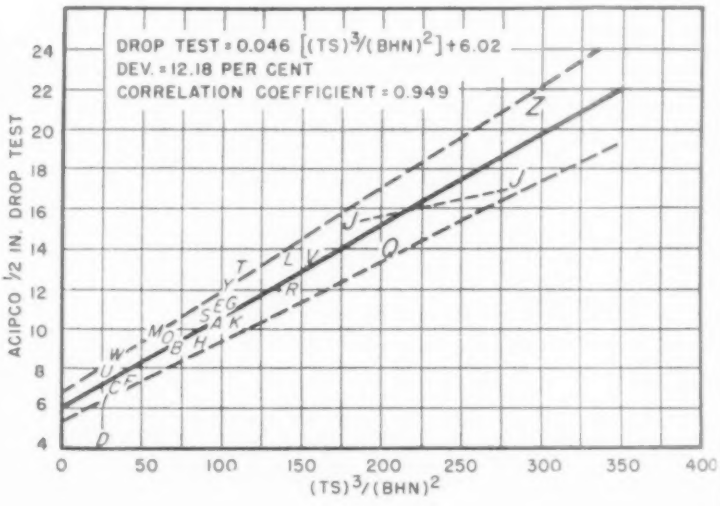

Fig. 8—Impact strength relation to tensile-bhn factor

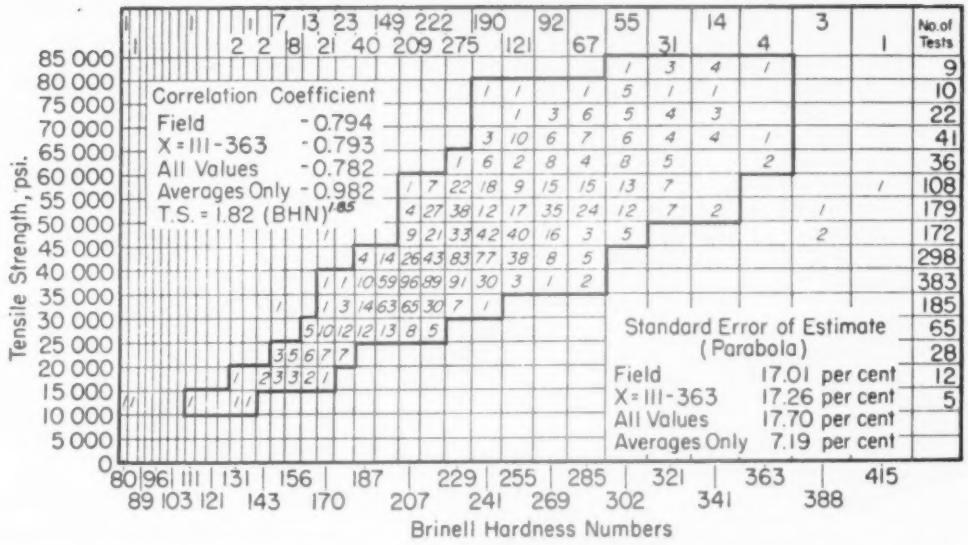
Correlation Coefficient
Field - 0.794
X = 111-363 - 0.793
All Values - 0.782
Averages Only - 0.982
T.S. = 1.82 (BHN)^1.85
Standard Error of Estimate (Parabola)
Field 17.01 per cent
X = 111-363 17.26 per cent
All Values 17.70 per cent
Averages Only 7.19 per cent
No. of Tests
Tensile Strength, psi.
Brinell Hardness Numbers

Fig. 10—Relationship between tensile strength and brinell hardness of 1553 gray irons (MacKenzie[6])

is complicated by many other factors, particularly by graphite type which markedly affects strength but affects hardness to a lesser degree. Consequently, the relation shown in Fig. 10 as developed by MacKenzie[6] from over 1500 tests, is a rather broad one.

This chart is useful as a gage of quality of a gray iron. If an iron contains an appreciable amount of Type D graphite, which notably confers poor toughness and poor wear resistance, it will be found to lie in the lower portion of the field for a given hardness level. Conversely, when an iron plots in the upper part of the field this is an indication that the graphite form is most favorable for toughness and wear resistance as well as for strength. Inoculated irons in comparison with all iron were shown by MacKenzie[6] to lie in the upper part of the field.

Since transverse strength varies broadly with tensile strength it is apparent that a relation similar to that of Fig. 10 will be found for transverse strength vs. brinell hardness.

Since a high ratio of tensile strength to brinell hardness indicates a grapite form favorable to best toughness, it is to be expected that impact strength will show correlation with some tensile/brinell ratio. Fig. 8 shows drop test impact plotted against TS^2/bhn^3. This abscissa value was shown by MacKenzie[6] to give a higher correlation coefficient with impact strength than either TS/bhn or TS^2/bhn.

When in the transverse test the complete stress-strain curve is obtained the area under the curve gives the work done in breaking the bar which is expressed as inch pounds transverse resilience. It has been shown[5] that the single blow pendulum impact tests give results which follow closely the resilience measured in the transverse test.

One strength value which does correlate well with brinell hardness is the compressive strength. The irons from the 1933 Impact Report[5] are plotted in Fig. 6.

Testing Nodular Graphite Cast Iron—Any present day discussion of gray cast iron is incomplete without consideration of nodular graphite cast iron. Although in mechanical properties this material more nearly resembles malleable iron or cast steel, compositionally and structurally (except for graphite shape) it is a true gray cast iron. The evaluation of nodular irons by mechanical testing poses some entirely different problems. Since this material may have appreciable ductility and may vary considerably in this property, a simple tensile test for strength is entirely inadequate as a specification test. More information may be obtained from the transverse test when deflection values are measured and stress-strain curves plotted. Tests on 1.20-in.-diameter transverse bars (A-48 bar B) have been used to evaluate the properties of nodular graphite irons (Fig. 9).

Tension testing of nodular graphite iron should follow the methods used for malleable iron or cast steel where yield point and per cent elongation, as well as the tensile strength, are determined. Probably the most consistent type of test bar for evaluating the true properties of a material is the keel block coupon as used by steel foundries and described in the *Steel Castings Handbook*[7]. The (*Please turn to page* 218)

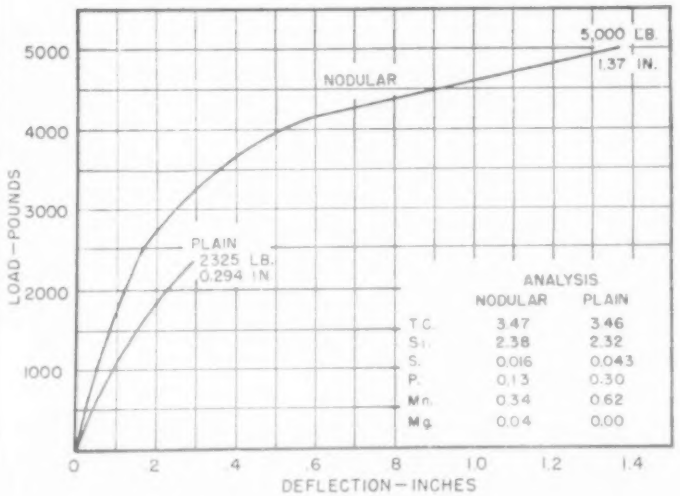

Fig. 9—Typical transverse stress-strain curves for gray iron and nodular graphite iron specimens

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STEEL FOUNDRY

Core and Molding Sands

In this third of five articles the author concludes his discussion of metal penetration into molds and cores, and takes up the subject of types of sands and binders. Physical properties and applications of such binders as clay, cereal, pitch, lignin, gilsonite, resins and core oil are described

CERTAIN experimenters[7, 8] have attributed the penetration of steel into molds and cores to the formation of iron oxide on the surface of the metal. According to their reasoning, the FeO unites with the silica of the mold to form fluid silicates of iron, which seep into the pores of the sand. To account for the presence of the metallic iron in the penetrated material, these authors suggest that the iron compounds, after having penetrated the sand, are reduced to metallic iron again by the carbon of organic binding materials. One of them points out that penetration, by whatever means it occurs, must be a capillary phenomenon. In common with some of those who discussed the papers in which these views were first advanced, the author finds it difficult to conceive of the veins, several inches from the contact surface of the sand and the steel, having been produced by the reduction *in situ* of sheets of iron oxides or silicates.

Moreover, in cores heavily faced with mixtures of fine alumina and small amounts of western bentonite and oil, severe penetration of the type associated with veining has been known to occur. In the facing of these cores, not enough silica was available to form much iron silicate, so that if penetration was not by metallic iron, it must have been by iron oxide rather than by iron silicate. Some support for the view that a great deal of iron oxide is formed upon the surface of liquid steel and that this oxide is to some extent a contributing cause of metal penetration, is given by certain observations of the author.

In using cores faced with fine alumina mixed with several different bonding agents, it was found that a thin layer of black material perhaps ⅛-in. thick was produced at the mold-metal interface. This layer adhered to the castings, but was readily cracked off with air hammer and chisel. The surface of the steel was then quite smooth and entirely free from sand. The alumina with which these cores were faced to a depth of 1½ or 2 in. was very fine, 95 per cent passing through the 200 mesh screen, and the permeability of the mixture was so low as to be almost negligible. Partial analysis of the alumina and of the black layer removed from several different castings is shown in Table III.

Table III

Material		SiO_2	Al_2O_3*	Fe_2O_3
Alumina		0.72	95.75	1.75
Black layer	(Alumina-bentonite)	1.62	31.82	65.33
	(Alumina-bentonite)	1.04	13.29	85.31
	(Alumina cement)	2.64	6.88	89.24
	(Alumina oil-cereal)	10.18	36.62	53.01
	(Alumina oil-cereal)	8.78	13.43	76.85

* By difference between $Al_2O_3 + Fe_2O_3$ and Fe_2O_3.

No penetration of the mold by metal had occurred, and enough iron oxide had been absorbed by the skin of the mold to convert this thin layer into a material consisting of from 50 to nearly 90 per cent iron oxide. That the highest percentage of Fe_2O_3 was found in the surface material formed on a core composed entirely of very fine alumina, portland cement and water, is quite striking.

As will be discussed in greater detail later on, this combination of fine alumina and cement is about the only material that will prevent severe sand adherence at certain areas, notably near the gates, on heavy steel castings poured in molds composed of sand bonded with cement. The same material is successfully used to face large cement-sand cores at the points exposed to the flowing steel for the longest time, and for facing the molds at corners where two sections join. Provided (*Please turn to page* 232)

Table IV

	As Rammed	15 min.	30 min.	1 hour	3 hours
10 *per cent Kaolinite*					
Moisture %	3.8	3.35	2.95	2.55	1.50
Green strength psi	7.6	13.2	17.2	21.8	30.0
Moisture %	5.2	4.75	4.40	3.7	1.95
Green strength psi	4.0	5.5	8.0	13.5	40.0
12 *per cent Illite*					
Moisture %	4.2	3.65	3.37	2.9	2.05
Green strength psi	8.5	12.2	15.4	20.4	32.3
Moisture %	5.4	4.85	4.47	3.95	2.70
Green strength psi	5.05	8.5	11.6	17.1	33.3
6 *per cent Montmorillinite*					
Moisture %	3.2	2.85	2.66	2.3	1.7
Green strength psi	7.75	9.90	11.0	15.8	27.6
Moisture %	4.6	4.3	4.0	3.7	2.9
Green strength psi	5.87	7.0	8.6	11.7	22.8

PERMEABILITY

GREEN COMPRESSION PSI

GREEN COMPRESSION PSI

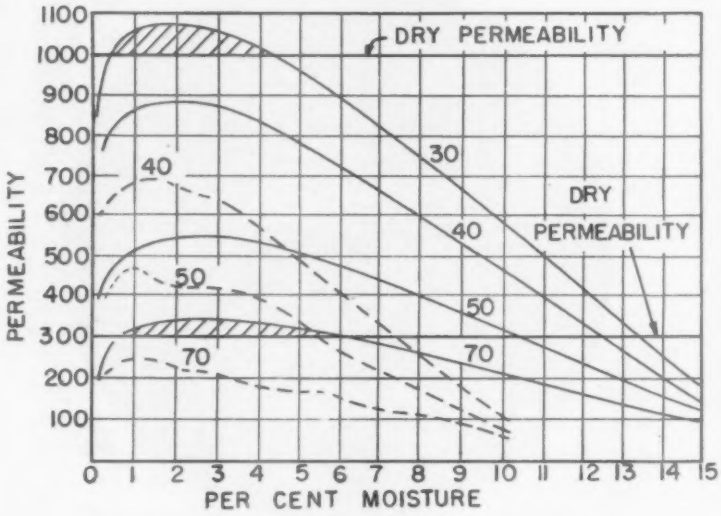

Fig. 7—Moisture vs. permeability of round-grained sand (dashed lines) and angular-grained sand (solid lines). Numbers on lines indicate the grain size

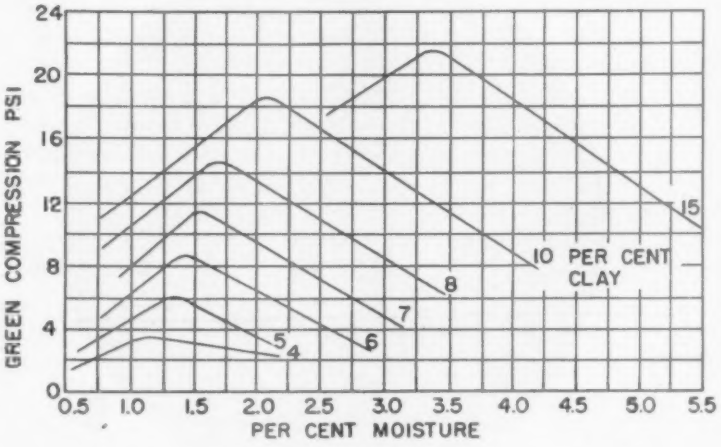

Fig. 9—Relationship of green compression strength to the percentage of moisture in sand bonded with varying amounts of kaolinite (Grim and Cuthbert)

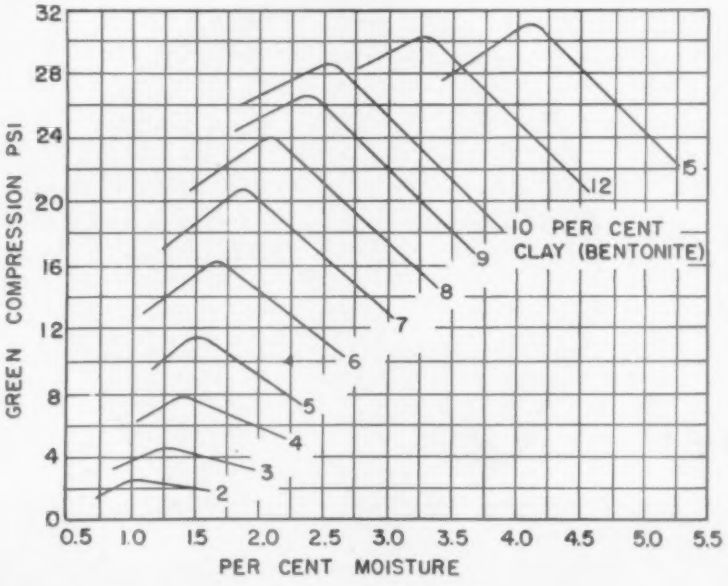

Fig. 11—Similar to the two preceding charts, green compression strength and moisture are plotted for a bentonite-bonded sand (Grim and Cuthbert)

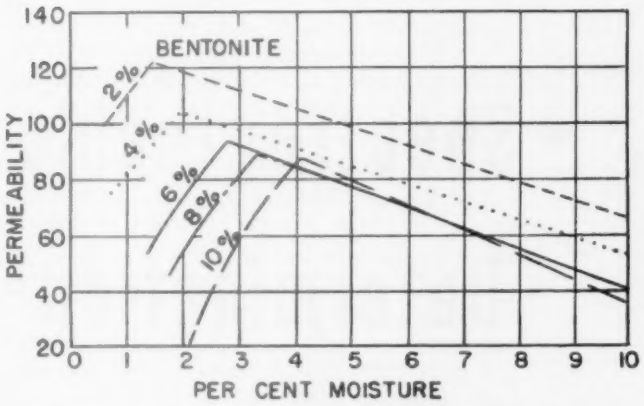

Fig. 8—Showing variations in the green permeability of a washed silica sand mixed with different percentages of bentonite and water (Briggs and Morey)

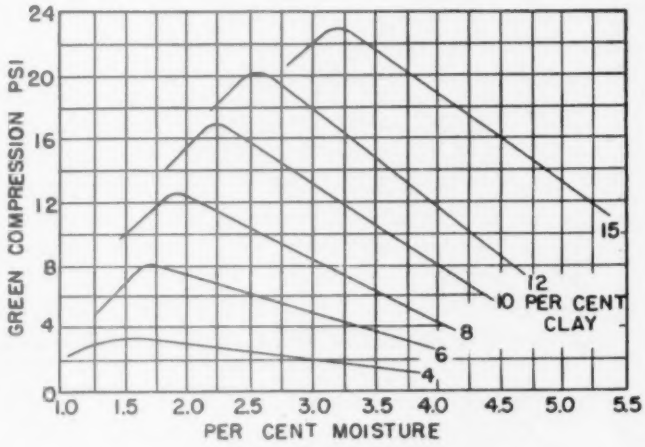

Fig. 10—Green compression strength also is plotted here against moisture but sand is bonded with different proportions of illite (Grim and Cuthbert)

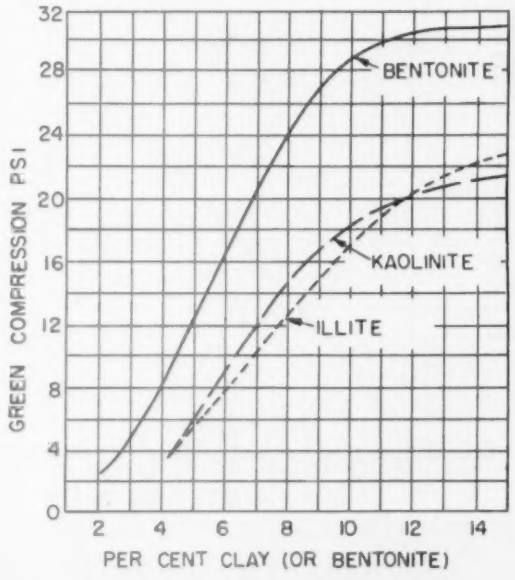

Fig. 12 — Illustrating the maximum compression strength developed in sand with increasing percentages of clay or bentonite bond (Grim and Cuthbert)

• Spectrographic Determination of Magnesium in Nodular Iron

By FORD R. BRYAN
Manufacturing Research Laboratory
G. A. NAHSTOLL and H. D. VELDHUIS
Quality Control Laboratory
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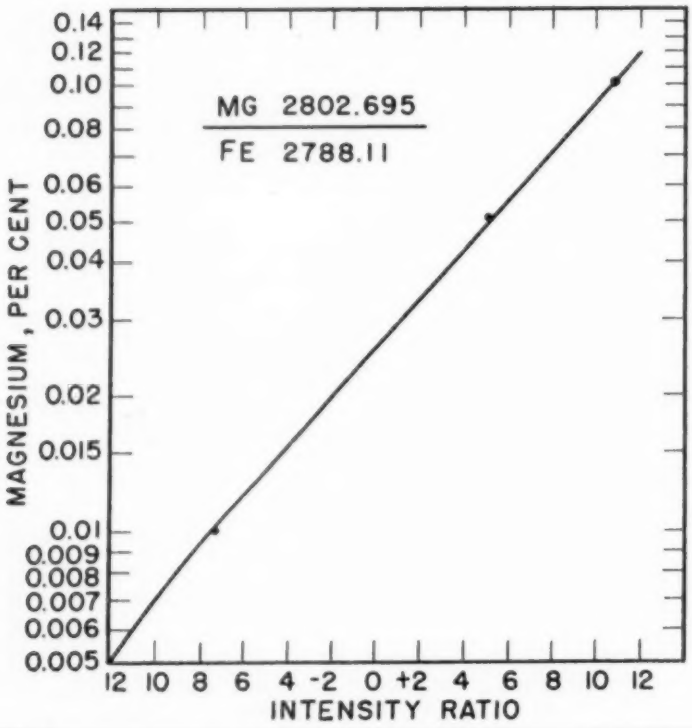
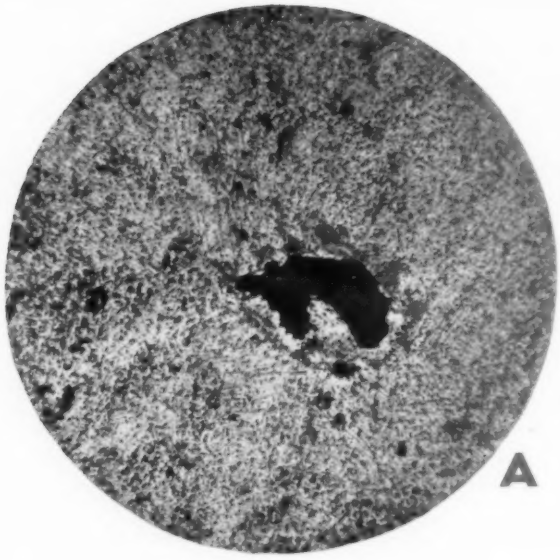
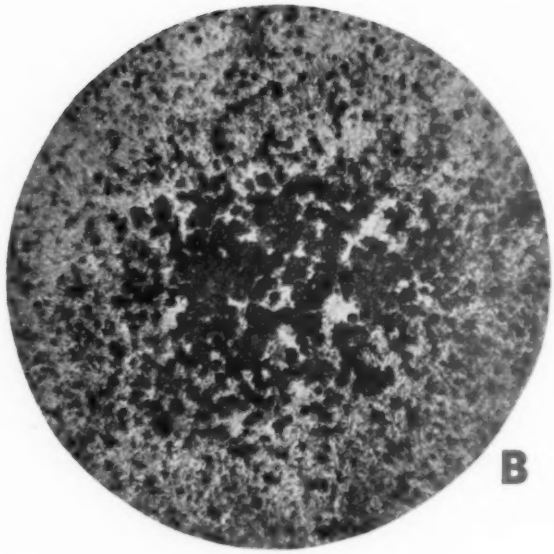






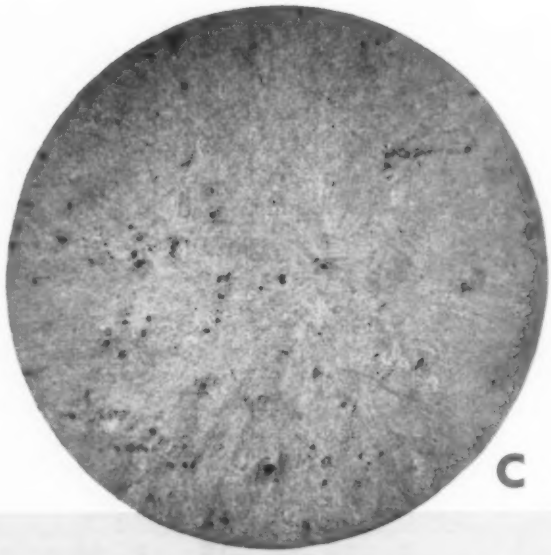


Fig. 1 (left)—Analytical curve based upon synthetic solutions. Fig. 2 (right)—Spectrographic samples of magnesium-treated iron taken at center areas of sample rod cross sections. *A*—Sample gave low analytical precision presumably because of large center void. *B*—Sample gave low analytical precision presumably because of segregated nonuniform structure. *C*—Sample gave satisfactory precision

RECENT advances toward the production of magnesium-treated nodular graphite cast iron have indicated the need for a rapid method of analyzing iron for magnesium. The low concentrations of magnesium involved suggest the adoption of a spectrographic method from the standpoint of both speed and accuracy of analysis. Since spectrographic control analysis of cast iron by spark excitation of metallic samples is well established for many elements,[1, 5] it is advantageous to utilize as much as possible of the same general procedure for the determination of magnesium.

A series of solid metal samples of known magnesium content with which to calibrate an analytical working curve is required for a typical metallic electrode method for cast iron. Since analyzed standards for magnesium in iron are not readily available, a procedure employing synthetic solutions was used to develop a group of metallic standards.

A satisfactory magnesium determination is dependent on the presence of sufficiently sensitive magnesium lines within the wave-length range customarily employed for iron analysis and freedom of one or more of these sensitive magnesium lines from interference due to iron or any elements other than magnesium. Upon investigation it was found that three or four sufficiently sensitive lines are available, and of these lines at least three are sufficiently free of interference to be usable.

The procedure described consists of two parts: First, a spectrographic solution method[6] of analyzing metal rods to be used as standards for the control analysis; and, second, a technique for determining magnesium as a part of the customary spectrographic analysis of cast-iron rods or pins.

In the spectrographic solution method for analyzing metal rods for use as standards, iron and magnesium chlorides are sparked from graphite electrodes. Magnesium line 2802.69 Å provides good sensitivity throughout the range 0.01 to 0.10 per cent Mg when magnesium chloride is sparked from graphite electrodes for a period of 12 sec without pre-exposure. Higher and lower concentrations may be measured by decreasing or increasing the exposure time. The time involved in making an analysis by this method is about an hour, so it is satisfactory for the analysis of standards and occasional samples but too slow for direct foundry control. The solution method is, however, preferable for iron samples of unknown metallurgical history, and in cases where excessive segregation is thought to exist. A precision of ±10 per cent of the magnesium present is attainable.

This elegant method, however, is not directly applicable to the determination of magnesium in cast-iron rod or pin samples simultaneously with the determination of the other elements in cast iron, namely manganese, silicon, chromium, nickel, molybdenum, etc. These latter determinations require the established procedure employing a 40-sec exposure with 5-sec pre-exposure in conjunction with an invariable plate processing technique. The determination of magnesium must fit itself into this pattern. There is no single magnesium line which is entirely adequate under these conditions, but Mg 2795.53 Å can be used for the range (*Please turn to page* 244)

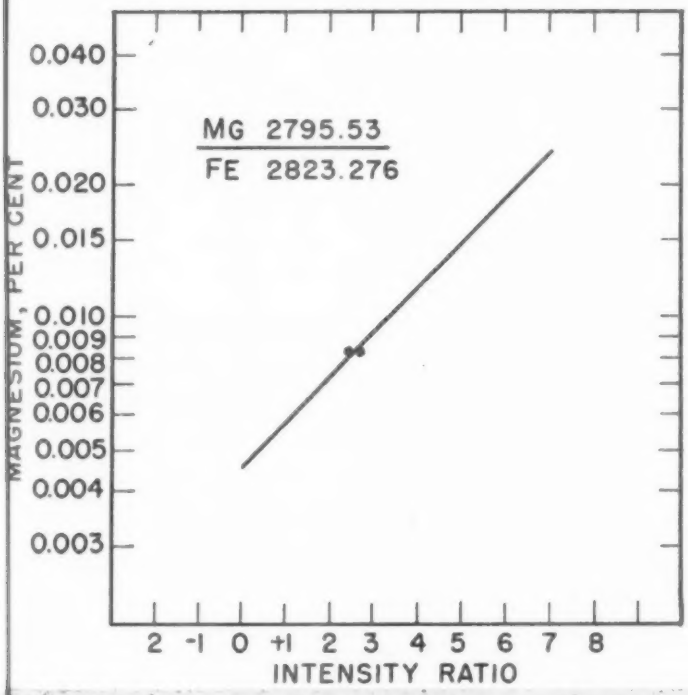


Fig. 3—Working curve for low magnesium range

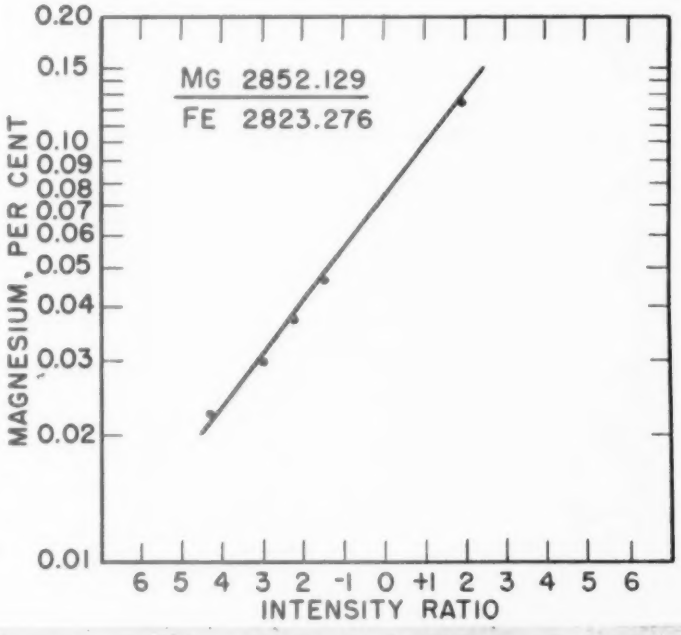


Fig. 4—Working curve for high magnesium range

QUESTIONS and A

Dry Sand for Making Bushings

Q.—Can you recommend a satisfactory dry sand mixture for brass bushings weighing between 800 and 1000 lb? Also a green sand mixture for the same.

A.—For dry sand molding of the bushings you mention, we believe that you will find the Millville gravel type sand to be the most suitable. Like many other sands, they are available in a number of different classes, but we believe that one with an AFS fineness number between 70 and 80 with a high clay content, known as the "strong" type, will give a permeability around 100. Your sand supplier with that information can give you a suitable grade.

With high clay content (around 18 per cent) these sands will have to be worked "wetter" to get the desired "feel" or handling properties, but since the mold will be dried thoroughly, that will not make any difference. For green sand molding the same sand probably can be used, but working it on the dry side is more difficult. Hence, it will be advisable to use a regular open molding sand of about the same grain fineness and permeability, but with a lower clay content, say around 12 per cent. Here again it will be advisable to consult with your sand supplier.

Lead Temperature Is Too High

Q.—In certain shuttles we manufacture we fill an opening with babbitt or lead. That metal or alloy is melted in an electrically heated pot holding about 35 lb with a $\frac{1}{8}$-in. bottom opening. When it is poured into the cavity a certain amount of gas is generated due to the wood burning which splashes the metal over the sides of the shuttle. Metal performs best when poured at an elevated temperature and height of fall is kept to a minimum. Is there a flux or quick freezing alloy which will eliminate the trouble. Analysis of the alloy is not extremely important, but it should be freely machinable. Metal should set up immediately after pouring so that the shuttle can be passed on to the next production step.

A.—It appears that most of your difficulty in spattering of the lead or babbitt could be prevented by pouring at a lower temperature, and we believe that you could employ considerably lower temperatures if you would enlarge the pouring orifice in the melting pot. Since there is no need for the metal to be hot enough to alloy or join the base material as in the case of making a bearing, it is only necessary that it be just fluid enough to fill the cavity, and hence, slightly above the melting point. With a larger opening in the pot, the cavity would be filled quicker, and since the metal is only slightly above its melting temperature, it would freeze more rapidly.

If for some reason those features cannot be put into practice, you might try any of a number of low melting point alloys instead of the lead or babbitt. For example, an alloy of 14.5 per cent Sn, 48 per cent Bi, 28.5 per cent Pb, and 9 per cent Sb melts at 440° F and is solid at 217° F. Another containing 15.5 per cent Sn, 52.5 per cent Bi and 32 per cent Pb melts at 205° F and freezes just under that temperature. An alloy of 1 per cent Sn, 55 per cent Bi and 44 per cent Pb melts at 248° F and is solid at 243° F.

Preparing Blacking for Mold

Q.—On some of our molds the wet blacking does not serve as satisfactorily as on others. It does not produce a uniformly smooth face on the casting. We shall appreciate an opinion whether you consider the blacking, the binder, the method of application or the drying method responsible for this condition.

A.—Any of the items referred to might be responsible, but since you do not offer any detail on the composition, method of application or drying oven procedure we are handicapped in suggesting a solution of the problem. The most puzzling feature is the fact that presumably the same technique and material are employed on all the molds. Since the blacking serves satisfactorily on a number of molds, it is reasonably certain that composition of the material is not at fault.

A possibility exists that the blacking is not prepared in a common or central mixer. Each operator may prepare his own supply and the resulting product reflects his skill or lack of skill and knowledge. Method of application may be a factor. The blacking may be applied with a brush, a swab, or a spray gun. Where the surface of the mold is finished or slicked with the tools, some men lean too heavily on the tools and remove a considerable amount of blacking. The remainder is not thick enough to protect the surface of the mold.

In a prominent foundry noted for the excellent appearance of its castings, preparation of wet blacking for the mold and core faces is not left to the individual judgment of molder or helper. A high grade blacking mixed with water to show a hydrometer reading of 40° Baume is prepared in a 150-gallon iron pot provided with a motor-driven agitator. In accordance with modern foundry practice the black-

Answers

ing is applied to molds and cores with a spray gun and then brushed to a smooth finish to produce an exceptionally smooth, clean surface on the castings.

Vacuum Aids in Filling Mold

Q.—We are interested in casting small pieces in a vacuum, and will appreciate any information on the subject.

A.—It is our impression that your reference to casting small pieces indicates the use of the investment molding process for production, and a common method employed in that practice to promote filling fine passages in the mold with molten metal, is to set the mold over an opening leading to a vacuum pumping system. In one plant the vacuum pump capable of creating a vacuum of 25 in. of mercury is mounted under a steel topped table. A quick acting valve leads from the pump to a section of steel tube or pipe slightly smaller than the mold. Top of that tube is level with the table top.

Since the molds usually are poured while still at an elevated temperature from the baking-out furnace, a wet asbestos ring slightly larger than the mold is used as a seal between the tube and mold bottom. In operation the hot mold is set on the wet seal ring, the vacuum valve opened, and the molten metal poured in. In this procedure it is necessary to have the mold in a metal flask. If no flask is used, the tube will have to extend to practically the height of the mold, and a taper ring used as a seal at the top.

Sample Forms for Cost System

Q.—Can you supply us with sample cards or forms covering the processing of castings through a jobbing gray iron foundry? We are anxious to arrive at our cost in a more accurate manner than at present.

A.—We regret that we are not in position to supply sample forms covering foundry cost keeping methods. From time to time we have presented articles from various authors dealing with the subject of costs in the foundry. These articles are illustrated with cards which have been used by the authors in developing and maintaining cost systems. Similar articles have been presented at foundry conventions and regional meetings of the AFS. If you have access to back copies of THE FOUNDRY, you will find enough material to develop your own system to meet your particular requirements. Various phases of the subject have appeared in the following issues of THE FOUNDRY: 1949, May, p.116; 1948, January, p.99, February, p.84, October, p.122; 1947, February, p.72, March, p.108, August, p.92, November, p.85; 1946, April, p.88, November, p.83. The Gray Iron Founder's Society, Cleveland, has published a book on foundry cost keeping methods. The American Foundrymen's Society has two books on the subject: *Foundry Cost Methods* and *Classification of Foundry Cost Factors.*

Hold Pattern Board in Place

Q.—We would like to know if THE FOUNDRY ever has published any information on methods for holding flask mounting boards on a flat plate. Our problem is to find some means to hold securely in place 1-in. plywood mounting boards approximately 30 x 30-in. on a flat plate roughly 57½ x 36 x 2-in. with a slightly larger recess than the 30 x 30-in. board but of the same 1-in. depth. This flat board then would be mounted on a 1500-lb rollover molding machine.

A.—We do not recall any articles relating to the fastening or attachment of pattern boards or mounts to well-boards. So far as we can find out, the usual method is to bolt them together. In cases where many pattern changes are made, the well-board is fitted with dowels, and the holes in the pattern boards are located so that the latter are lined up in relation to the flask pins on the well-board.

For mounting small plastic patterns in plywood Schumacher developed a method of routing grooves around the edges of the plastic and the mounting board. A low melting point alloy is poured in, and it is claimed the method operates quite well. In this case the fit between pattern and board is reasonably tight. Some details are given in an article "Plastic Matchplates Made by New Process" by Talbott and

GANGWAY!

By J. A. PATTERSON

"Oh yeah! If you think you're tired of motor block casting . .!!"

QUESTIONS and Answers

Lessman, THE FOUNDRY, February, 1948.

Another possibility might be the use of grooves in the mounting board and eccentrically mounted rods in the well-board which could be turned to exert a downward and sideward wedging action. Then, of course, one might use the procedure employed by printers for locking type in chases or forms. They employ quoins, which are pairs of wedges with teeth or serrations along the facing edges. The wedges are drawn together by inserting a key between the teeth and turning.

Cement Bond for Molding Sand

Q.—We would like to obtain some practical references on cement molding, and would like to know if you have any information.

A.—Extensive descriptions of the use of cement as a bonding agent in sand for the production of steel and gray iron castings were presented in THE FOUNDRY quite some time ago, and if you have access to bound volumes of the publication, we suggest you consult the December, 1935 and the January, February and March, 1936 issues containing a series of articles entitled "Steel Castings Produced in Molds Bonded with Cement", and the November, 1937 issue for one entitled "Cement Used as Binding Agent in Gray Iron Foundry".

Briefly the practice is to use a clay-free sand, uniform in grain size. All new sand is used as a facing, and the proportions are 100 lb sand, 13 lb early high strength cement, and 6 per cent water. In hot weather more moisture is used to take care of evaporation, but the content should not exceed 8 per cent. Backing sand is formed of used cement-bonded sand crushed in a hammer mill, and a suitable mix is 100 lb old sand, 10 lb cement and 7 per cent water.

Sand should be used within 2½ hr in the temperature range 70 to 80°F, and within 1 hr when the range is 100 to 110°F. Molds should be air dried for 72 hr before metal is poured into them. When sectional molds are made, the sections are allowed to air dry for 4 to 6 hr which stiffens them sufficiently so that they can be lifted. Molds usually are made in wooden supporting structures which are removed after the previously mentioned stiffening period.

Method for Tinning Gray Iron

Q.—Can you suggest any procedure for tinning cast iron, especially for castings which are used in food processing?

A.—Tinning of cast iron to obtain a solid, tightly adhering coat has been somewhat difficult in the past due to the presence of graphite which tends to leave a thin sludge or deposit on the surface after the pickling operation; not to mention the presence of graphite flakes in the surface skin of the casting. Tin, of course, will not adhere to graphite. However, a salt bath procedure developed the past few years by the Tin Research Institute is claimed to eliminate previous trouble, and provide solid coatings particularly suitable for food processing equipment.

Procedure is to pickle the gray iron castings in a 10 per (by weight) inhibited sulphuric acid bath maintained at 185° F for 30 seconds, or in a cold 50 per cent (by volume) bath of hydrochloric acid for 2 to 5 minutes. The castings are rinsed in water and dried, and then placed in a fused mixture of equal parts by weight of sodium nitrate and potassium nitrate held at a temperature of 662 to 752° F for 15 minutes. Castings are removed from the bath, the excess salts washed off with cold water, and then pickled in cold 10 per cent (by volume) hydrofluoric acid for 1 minute. After rinsing, the castings are fluxed by dipping in an aqueous solution of zinc chloride and sodium chloride eutectic. The latter contains 82 per cent by weight of zinc chloride and 18 per cent sodium chloride which are fused together. The aqueous solution contains 25 per cent by weight of the eutectic.

Fluxed castings after drying are tinned by the double pot method. First pot is maintained at 572° F and is covered with a thin layer of the fused eutectic chloride mentioned previously. Castings are immersed for 3 to 5 minutes or longer as the section thickness of the casting requires, and then removed and placed in the second tin pot held at 464 to 500° F. Tin bath is covered with palm oil, tallow or other tinning oil. Castings then are removed, drained and cooled in air, or quenched in paraffin oil. The latter step gives a thicker and more brilliant coating, and is necessary with thick section castings to avoid excessive draining and yellow stain. Quenching bath may be a layer of paraffin oil 2 in. deep on top of cold water—the castings being lowered slowly through the oil.

Apply Forced Draft to Furnace

Q.—We are interested in obtaining some type of equipment which would supply forced draft for our furnaces. We use No. 60 crucibles, pit-type furnaces, and have a battery of 12.

A.—Forced draft can be applied to your furnaces by installation of motor driven blowers, and the problem mainly will be in deciding the particular arrangement. For example, a good plan would be to have a separate motor and blower for each furnace which would provide individual control, but probably would be high in first cost. Other arrangements would be to have larger motors and blowers for banks of two, three or more furnaces, or one motor and blower of sufficient capacity to supply air to all 12 furnaces. However, we believe that the last mentioned arrangement would present problems unless nearly all of the furnaces are in operation at the same time.

There is no doubt that you could increase your melting speed considerably by use of forced draft on the furnaces since Laing and Rolfe in *Non-Ferrous Foundry Practice* state that with natural draft, coke-fired furnaces 150 to 200 lb of gun metal requires 2 to 2½ hr for the first heat and 1¾ to 2 hr for subsequent

(*Concluded on page* 108)

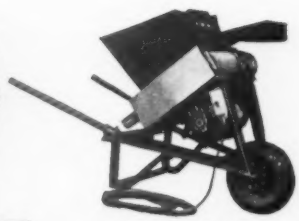
from 4 to 50 tons per hour

From 4 to 50 tons of properly prepared molding sand per hour — depending upon the size and model you choose. Regardless of the capacity you require —one or a combination of Royers is available to meet the need.

Only Royer Sand Separators and Blenders provide Six Point Sand Conditioning—(1) thorough refuse removal, (2) positive lump breaking, (3) complete blending and mixing, (4) even distribution of moisture, (5) increased permeability, (6) double aeration. The velvety, properly conditioned sand discharged by the Royer makes true-to-pattern molds, cuts discount losses, reduces facing sand requirements and cleaning room costs.

Over 8,000 Royers are now in use in foundries of every kind—large or small — jobbing or production — ferrous or non-ferrous. Available in electric motor, gasoline engine or belt-to-tractor drives. Send for bulletin giving complete information on this cost cutting foundry tool.

Model DPL-FR
40 Tons
per hour



The Junior Royer
4 to 7 tons
per hour

Model NB-4
7 to 9-½ tons
per hour

Model NC-2
12 to 15 tons
per hour

Model NDP
20 to 25 tons
per hour

Model NRS
40 to 50 tons
per hour

Model NDC
Combination
20 to 25 tons
per hour

Model RC
Combination
40 to 50 tons
per hour

ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.
159 PRINGLE ST., KINGSTON, PA.

QUESTIONS and Answers

(*Concluded from page* 106)

heats while with forced draft furnaces 120 lb of gun metal is melted in 30 minutes.

One thing which should be kept in mind with changing from natural to forced draft is carrying away the gases of combustion. Assuming that 131 cu ft of air at 60°F and 14.7 psi atmospheric pressure is required for combustion of 1 lb of coke, and that 45 lb coke is required per 100 lb of metal with natural draft and 25 lb coke per 100 lb metal with forced draft, the amounts of combustion gas per minute can be determined.

Those values for 180 lb of metal with a natural draft melting time of 2 hr, and a forced draft melting time of 30 minutes at 60°F and 14.7 psi atmospheric pressure are in round numbers 85 cu ft and 196 cu ft per minute respectively. In other words over twice as much gas will be generated in a given time with forced draft as compared to natural draft. Of course, the volumes of those gases at elevated temperature will be considerably greater, but the actual quantities are not necessary for our purpose at the moment which is to point out that probably a larger stack or chimney will be required, or the furnaces will have to be hooded and connected to an exhaust system to prevent the gases from escaping into the foundry atmosphere.

As far as the particular type of installation of blowers is concerned, it will be advisable to call in representatives of blower manufacturers who can supply you with information on the most suitable arrangement for your foundry including first cost, and operating cost. Names and addresses of manufacturers can be found in the "Where-to-buy Directory" of THE FOUNDRY.

Bond Content of Sand Is Low

Q.—At the present time we are experiencing some difficulty with scabbing, washes and dirt in our regular production of brass, bronze and aluminum castings. Being of the opinion that our molding sand (No. 0 Albany) was not strong enough, we had it tested and found the following: Moisture 6.8 per cent, Permeability 25, and green compression 1 psi. We would like specifications for bettering these conditions as the figures show our sand heap to be poor. It has been suggested that we use southern bentonite in our persent molding sand to bring it up to strength while waiting for new sand to be shipped in. Will that binder be all right for production of brass, bronze and aluminum castings?

A.—We can see no reason why your sand cannot be brought up to a suitable working strength by the use of southern bentonite for production of your castings. The only precautions to be kept in mind are that the bentonites develop suitable bonding qualities with much lower quantities than when clays are used, and as a consequence the moisture content of the molding sand also is lower. With a green compression strength of only 1 psi, it is evident that your sand is extremely low in clay content; probably containing less than 5.5 per cent according to data presented by Dietert a number of years ago. Since the green compression strength should be around 7.5 psi you probably will have to add about 3 per cent southern bentonite and 3½ per cent moisture.

Before proceeding to adjust all your sand, it might be advisable to do some experimenting with a small batch of sand to determine the proper amount of bonding material and moisture to provide a suitable molding medium for your particular conditions. Bonding material should be mixed well in the sand in the dry state so as to incorporate it thoroughly into the sand. Possibly a better procedure might be to make a strong additive by mixing intensively 20 to 30 per cent bonding material with dry sand, and then using a suitable quantity of that for adding to the sand heap.

Stainless Steel in Crucibles

Q.—We will appreciate it if you will advise us as to the possibility of melting stainless steel in crucibles, and the proper procedure to follow.

A.—Stainless steels all contain high proportions of chromium, and therefore absorb carbon from any carbonaceous material they are in contact with in the molten state much faster than plain carbon steels. The carbon content of all the stainless steels must be controlled within close limits, and in the case of some of them, such as the 18 chromium-8 nickel class, the carbon must be kept very low.

Crucibles used for steel melting and for melting nonferrous alloys as well, are made of a mixture of about 50 per cent clay and 50 per cent graphite. Graphite of course, is nearly pure carbon, and even ordinary carbon steel melted in such crucibles absorb carbon from it rapidly. The stainless steels would absorb carbon even faster, and it would be impossible to control the carbon content, even at an impossibly high value.

Crucibles are made with a thin lining of clay which can be used to melt ordinary steels without carbon absorption as long as the lining is not cut through by the steel. After one melt has been made, the lining is likely to be too thin to be of any use, and even a new clay-lined crucible will often give carbon pick-up in melting plain carbon steel because the steel melts through the lining. With high chrome steels the chances of carbon absorption from this source would be very great. In fact we do not believe that the lining would stand up long enough to get the metal melted and hot. To attempt to make stainless steels in crucibles on a commercial basis is out of the question.

In England crucibles made of clay alone are, or were until quite recently used to melt steel, and with such crucibles there would be no carbon pick-up. The crucibles however, are very "tender", have to be heated up with the greatest care, and once in the fire, must be recharged for a second melt without allowing them to grow cold. With these pots it might be possible to make stainless steels of correct composition, but it is an expensive way to produce them, and a user of clay crucibles could not possibly compete with makers using proper equipment.

Cuts grinding time in half

Savings pay for tools in 5 months

THIS manufacturer of materials handling equipment was using universal electric grinders when the Rotor Application Engineer called to find ways of cutting grinding costs. The Rotor Application Engineer recommended replacement with Rotor Air Grinders and demonstrated them with these results:

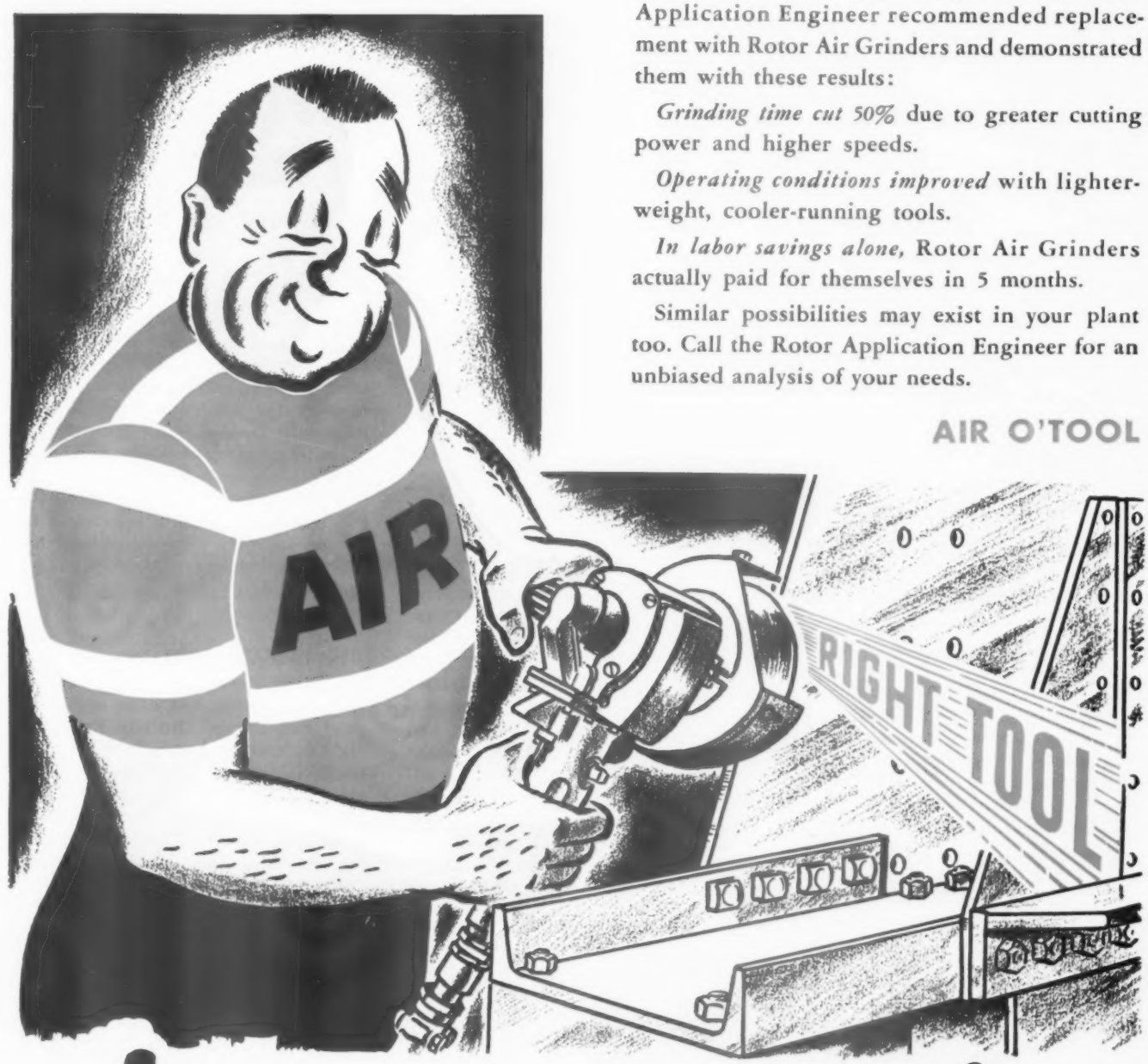
Grinding time cut 50% due to greater cutting power and higher speeds.

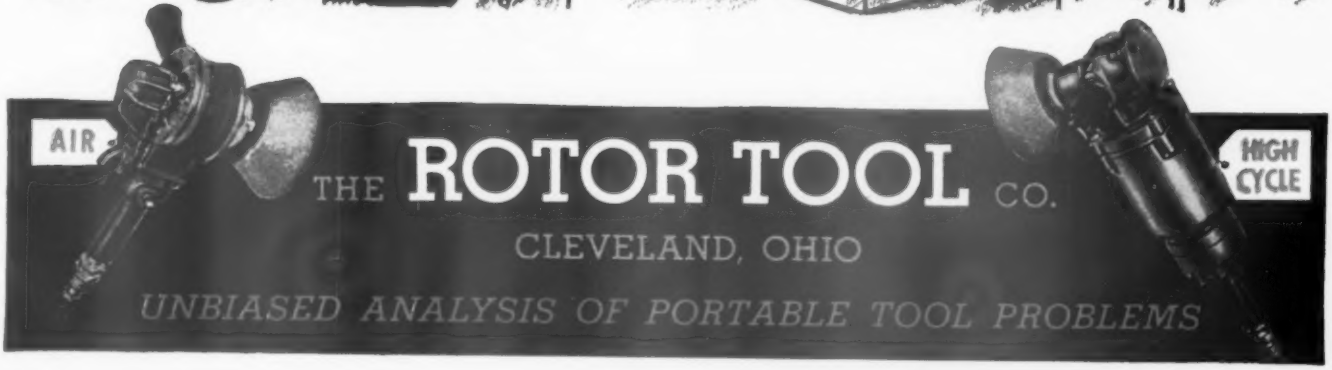
Operating conditions improved with lighter-weight, cooler-running tools.

In labor savings alone, Rotor Air Grinders actually paid for themselves in 5 months.

Similar possibilities may exist in your plant too. Call the Rotor Application Engineer for an unbiased analysis of your needs.

AIR O'TOOL





THE ROTOR TOOL CO.

CLEVELAND, OHIO

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

MEN of Industry

EDWIN W. HORLEBEIN, president of the Gibson & Kirk Co., Baltimore, was elected president of the National Castings Council, succeeding **Collins L. Carter,** president, Albion Malleable Iron Co., Albion, Mich., at the annual meeting of the council may 10. **Thomas H. Shartle,** president, Texas Electric Steel Casting Co., Houston, Tex., was elected vice president, **F. Ray Fleig,** president, Smith Facing & Supply Co., Cleveland, was re-elected treasurer and **Frank G. Steinebach,** editor of THE FOUNDRY, Cleveland, was re-elected secretary. Mr. Horlebein, who is completing a year's term as national president of the American Foundrymen's Society, has been associated with Gibson & Kirk Co. since 1924, when he became its president. He has long been identified with American technical and trade organizations and holds membership in the British Institute of Metals. Mr. Horlebein is a past president of the Non-Ferrous Founder's Society.

♦ ♦ ♦

Leroy P. Robinson, for 21 years director of core oil sales, Werner G. Smith Co. Division, Cleveland, has been elected vice president, Archer-Daniels-Midland Co., and chief of the Werner G. Smith Foundry Sales Division of that company. Mr. Robinson is one of the best known men in the foundry supply industry. He is a past president of the Northeastern Ohio Chapter of the AFS, a past director of the national society, and has spoken before practically every AFS chapter and local group. Mr. Robinson was born in Burlington, Iowa, Sept. 26, 1886 and later moved to Mt. Pleasant, Iowa, where he was graduated from high school in 1901. He was graduated from Lombard College, Galesburg, Ill., in 1906 with a bachelor of arts degree. From graduation until 1917, when he became associated with the Werner G. Smith Co., Mr. Robinson engaged in a number of widely diversified occupations unrelated to the foundry industry. From 1917 until 1928 he was New England manager for the Werner G. Smith Co., and for 8 years of that period also represented the Sterling Wheelbarrow Co. in New England. He returned to Cleveland as director of sales on Jan. 1, 1929.

♦ ♦ ♦

Fred J. Pfarr, recently elected president of the Northeastern Ohio Chapter of the AFS, is manager of Lake City Malleable Co., Cleveland. Mr. Pfarr, a native of Cleveland, joined the company in 1929, serving successively as metallurgist, foreman and superintendent prior to appointment to his present position in 1946. In addition to his activities in Northeastern Ohio Chapter, which he served last year as vice president, he is a member of ASM, AISE, Cleveland Engineering Society and the Works Managers Group of the Cleveland Chamber of Commerce.

♦ ♦ ♦

Raymond H. Filsinger Jr., formerly eastern sales representative, Vanadium Corp. of America, has been appointed sales manager of the eastern district with headquarters in the general offices of the company in New York.

♦ ♦ ♦

Announcement has been made of changes in plant management, Grede Foundries Inc., Milwaukee. **James L. Bird,** formerly assistant to the manager, has been named plant manager of the Liberty Division there. **Eugene Schneider,** until recently assistant manager, has been appointed plant manager of the Milwaukee Steel Division. **Leslie Woehlke,** for the past two years a supervisor at the Spring City Division, Waukesha, Wis., has been made plant manager there.

♦ ♦ ♦

Dr. George H. Zirker, until recently associated with Foundry Services Inc., New York, has been appointed chief metallurgist, Burndy Engineering Co., there, manufacturer of electrical connectors. Dr. Zirker a graduate of Technical Academy, Zurich, Switzerland, during the past 30 years has served as foundry consultant and metallurgist for Carnegie-

(Continued on page 112)

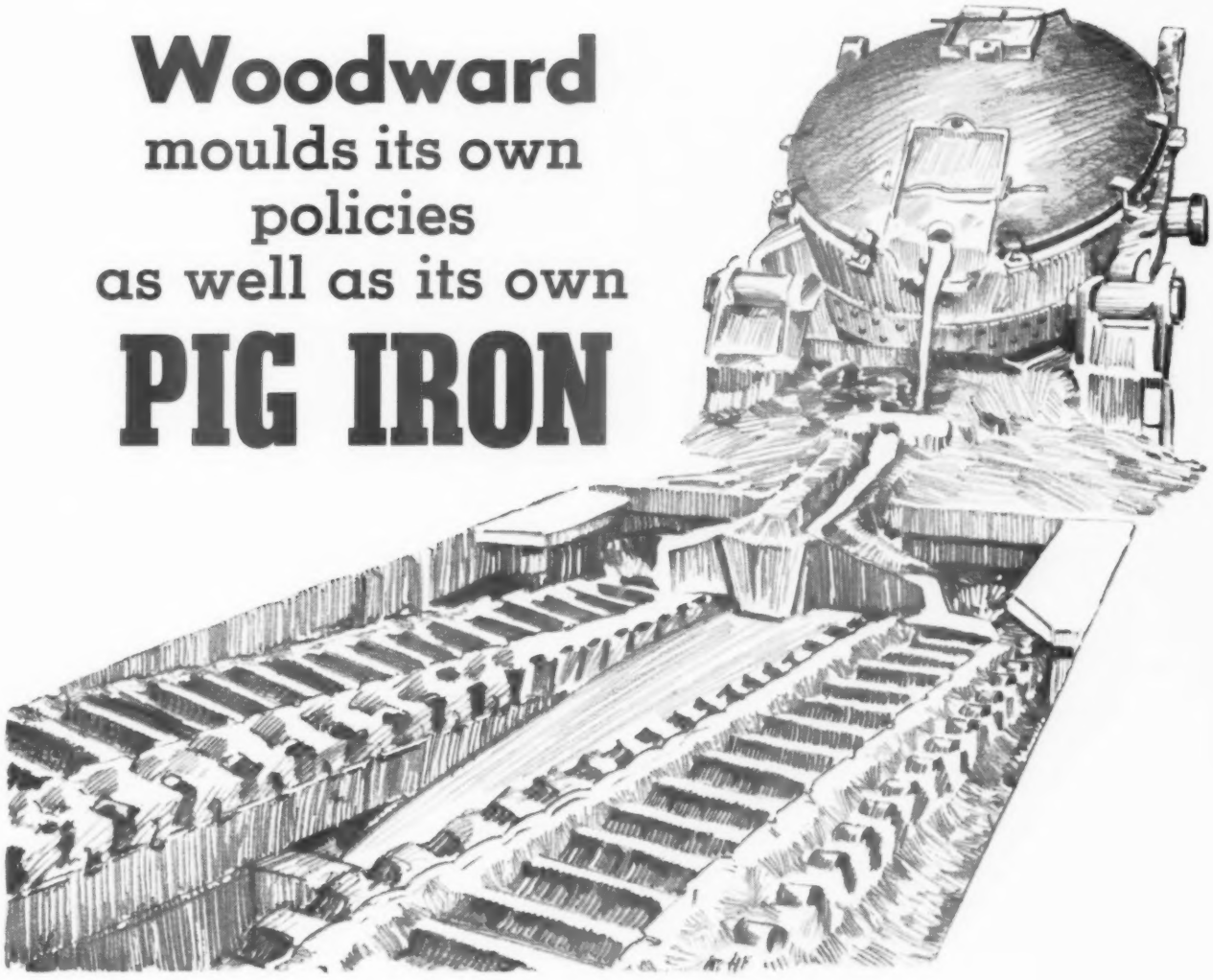
EDWIN W. HORLEBEIN

LEROY P. ROBINSON

FRED J. PFARR

RAYMOND H. FILSINGER JR.

Woodward
moulds its own policies as well as its own
PIG IRON



Woodward Company has always taken an especial pride in the maintenance of its position as an independent iron producer. This independent policy constitutes an asset of vital value—not only to itself but to those it serves. By operating as an independent company Woodward has been able both to mould its policies and its pig iron to meet able needs of the market and the demands of its customers.

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MEN of Industry

(*Continued from page* 110)

Illinois Steel Corp., Johnstown, Pa., the former Permanente Metals Corp., Oakland, Calif., and Taylor & Co., Brooklyn, N. Y.

♦ ♦ ♦

John M. Urban has been appointed a technical service representative in the coke sales department, Diamond Alkali Co., Cleveland, to contact gray iron foundries and other users of industrial coke in the northern Ohio, western Pennsylvania, western New York and southeastern Michigan areas. Mr. Urban attended Fenn College and John Huntington Polytechnic Institute. His entire industrial experience has been in Cleveland. He was chemist and foundry metallurgist, Ferro Machine & Foundry Co. from 1925-32, following which he was foundry metallurgist and melting foreman, Forest City Foundries Co. for 7 years. Since 1939 he has been foundry superintendent and metallurgist, Fanner Mfg. Co. Mr. Urban is a member and a director of the Northeastern Ohio Chapter of the AFS.

♦ ♦ ♦

Henry L. Tolan has been appointed secretary and elected a director of Dodge Steel Co., Philadelphia. Other new members elected to the board of directors are: John R. Baush: Chester S. Roberts Jr.; and John J Sullivan Esq., vice president, Market Street National Bank, Philadelphia.

♦ ♦ ♦

Jess Toth, secretary and a director of Harry W. Dietert Co., Detroit, has been elected chairman of the Detroit Chapter of the American Foundrymen's Society for the year 1950-51. Mr. Toth, who attended Detroit Institute of Technology, joined the Dietert company in 1935. Active in the Detroit Chapter for a number of years, he served as its vice chairman last year. Mr. Toth is a director of the Detroit Junior Board of Commerce.

♦ ♦ ♦

Otto A. Seyferth, president of the West Michigan Steel Foundry Co., Muskegon, Mich., recently was elected new president of the United States Chamber of Commerce. Mr. Seyferth was born in Grand Rapids, Mich., and began a 4-year apprenticeship with Oliver Machinery Co. there, at the age of 13, learning the machinist trade while taking correspondence courses. In 1919 he joined Bonbright & Co., New York investment bankers, and became widely known for reorganizing financially distressed companies. In 1924 he became president, Austin Machinery Corp., Muskegon, retaining that title when it was acquired by West Michigan Steel Foundry Co.

♦ ♦ ♦

A. Urban Morash, for the past 25 years foundry management, costs and production consultant, has joined the Industrial Castings Co., Detroit, as general manager. Mr. Morash is in charge of mechanization of the foundry which does experimental work for Detroit automobile manufacturers and production work on high pressure castings.

♦ ♦ ♦

G. R. Meyers, for the past 23 years manager of the core oil, paint and varnish division, Penola Inc., Chicago, affiliate of Esso Standard Oil Co., New York, has been elected a company director. Mr. Meyers is in the company's Mid-West sales offices in Detroit.

♦ ♦ ♦

Changes have been announced in the engineering department of United States Pipe & Foundry Co. **Edward Hering** has been named engineering consultant and **Lawrence T. Haugen** succeeds him as chief engineer. Messrs. Hering and Haugen will continue to make their headquarters at the company's general offices, Burlington, N. J. **Rudolph Landberg,** who has been appointed assistant chief engineer, will continue to maintain his office at the North Birmingham, Ala. plant.

♦ ♦ ♦

A. J. Edgar has been elected a vice president, Hunt-Spiller Mfg. Co., Boston, producer of gray iron and steel castings. Mr. Edgar joined the company in 1949 as general manager, following 3 years as works manager, Benton Harbor Malleable Industries Inc., Benton Harbor, Mich.

♦ ♦ ♦

Alex J. Juroff, formerly foundry metallurgist, Bendix Products Division, South Bend, Ind., has been appointed plant manager, Duramold Castings Inc., Mishawaka, Ind. Following graduation from Michigan State College, Mr. Juroff was a member of the faculty there from 1936-1940.

♦ ♦ ♦

W. S. Howard has been appointed sales engineer for automotive castings, Lake City Malleable Co., Cleveland. Mr. Howard was formerly chief inspector and more recently director of quality control, White Motor Co., Cleveland.

♦ ♦ ♦

W. M. Costley has been appointed district manager for the Hyster Co., Portland, Oreg., in the territory comprising Minnesota, Wisconsin, northern Illinois, Iowa, eastern Nebraska, North and South Dakota, and eastern Montana. He was formerly with Clark Equipment Co., Battle Creek, Mich., as regional sales supervisor in the

(*Continued on page* 115)

JOHN M. URBAN

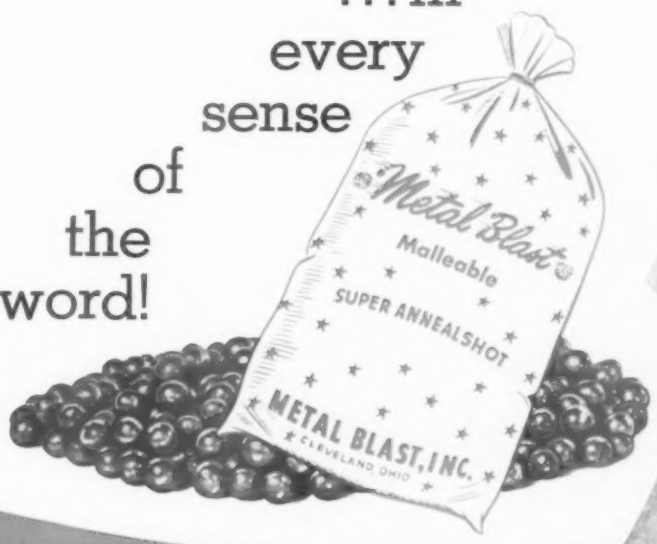
HENRY L. TOLAN

JESS TOTH

OTTO A. SEYFERTH

Super...

...in every sense of the word!



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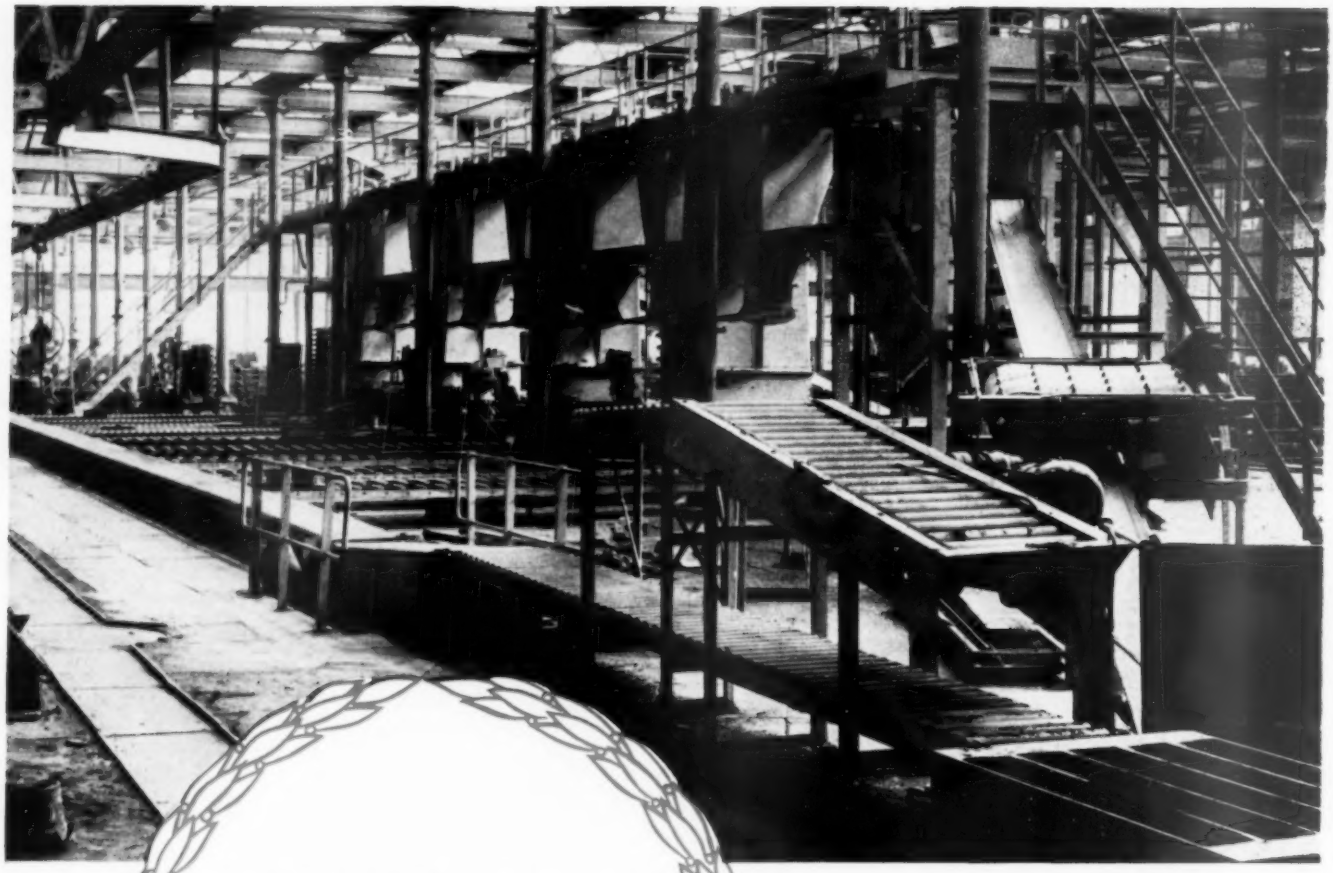

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STONE-WALLWORK LTD., 157 VICTORIA STREET, LONDON, ENGLAND

(*Continued from page* 112)

Chicago area. **Dan Stearns** will handle sales in Pennsylvania, New Jersey, Virginia, West Virginia and District of Columbia. Mr. Stearns was previously with Clark Equipment Co. as a dealer in Chicago and as a sales engineer.

♦ ♦ ♦

Alfred W. Gregg, consulting engineer, Whiting Corp., Harvey, Ill., has been named president of the Chicago Chapter of the AFS for the year 1950-51. Mr. Gregg, a native of Riverside, Ill., was graduated from Purdue University in 1904. Following a year as assistant chemist with Latrobe Steel & Coupler Co., Melrose Park, Ill., he was associated for 15 years with Bucyrus-Erie Co., South Milwaukee, as foundry superintendent, and with Bonney-Floyd Co., Columbus, O., as superintendent from 1929-36. He was foundry superintendent for Whiting Corp. from 1919 to 1923 and rejoined the company in 1936 as executive engineer in the foundry equipment department. Mr. Gregg was awarded the John H. Witing Gold Medal of the AFS in 1944. He is chairman of its Educational Division and a member of the executive committee of its Steel Division. He served as vice president of the Chicago Chapter last year.

♦ ♦ ♦

Walter W. Edens, who will serve as president of the Wisconsin Chapter of the AFS for the year 1950-51, is works manager, Badger Brass & Aluminum Foundry Co., Milwaukee. A native of West Allis, Wis., Mr. Edens was graduated from Marquette University in 1934, with a degree in mechanical engineering, later receiving his master's degree in metallurgical engineering from University of Wisconsin. After a year as engineer with Heil Co., Milwaukee, he spent 10 years with Ampco Metal Inc., there as chief metallurgist and technical director. He has been associated with Badger Brass & Aluminum Foundry Co. for 3 years. Mr. Edens has served as chairman of the Brass and Bronze Division of the AFS and represents the Nonferrous Founders' Society on the Technical Advisory Committee of the Foundry Educational Foundation. He served as vice president of the Wisconsin Chapter last year.

♦ ♦ ♦

William T. Bean Jr. has been appointed director of a new technical service center recently established by Industrial Electronics Inc., Detroit. Mr. Bean, at one time in charge of the stress analysis laboratory of the research division, Continental Motors Corp., Muskegon, Mich., and Detroit, was graduated from University of Oklahoma. From 1937-1940 he was sales and service engineer, National Supply Co., Pittsburgh. He spent the following 3 years at Purdue University, where he taught aircraft engine design and basic mechanical engineering, and was awarded his master's degree there in 1942. Two years ago he established a consulting service. In his new position Mr. Bean will combine activities in stress analysis with those of Industrial Electronics Inc.

♦ ♦ ♦

Earl Paltenghi has been named general manager, H. C. Macaulay Foundry Co., Berkeley, Cal. **Harold Henderson** has been appointed secretary.

♦ ♦ ♦

Fred H. Pillsbury has been named president, Century Electric Co., St. Louis, succeeding his father, **Edwin S. Pillsbury**, one of its founders and president since 1914, who will continue as chairman of the board of directors. Fred Pillsbury joined the company in 1927 following graduation from Washington University. He has been vice president in charge of operations since last July and a member of the board of directors since 1942.

♦ ♦ ♦

Marshall E. Cusic has been named a district sales engineer, Chain Belt Co., Milwaukee, with headquarters at the Pittsburgh district office. Mr. Cusic, a graduate of Purdue University, joined the company in 1937, and served in the methods and standards department of the chain and transmission division. Following military service he became assistant sales manager of the division.

♦ ♦ ♦

Malcolm W. Valentine has been named superintendent of inspection and quality control, Hunt-Spiller Mfg. Corp., Boston. He has been associated with the company since 1915.

♦ ♦ ♦

I. W. Mohr, formerly job foreman, has been appointed foreman of the foundry department, National Cash Register Co., Dayton, O., succeeding the late Clarence J. Dausch Jr. Mr. Mohr joined the company as a foundry apprentice in 1936.

♦ ♦ ♦

Thomas C. Ford has been appointed district manager of the Cleveland area, Pittsburgh Metallurgical Co., Niagara Falls, N. Y., producers of ferro alloys and metals. Mr. Ford's headquarters will be in the Union Commerce Bldg., Cleveland.

♦ ♦ ♦

Robert G. Settgas has been appointed assistant plant engineer, Key Co., East St. Louis, Ill. Mr. Settgas

ALFRED W. GREGG

WALTER W. EDENS

WILLIAM T. BEAN JR.

MEN of Industry

was graduated in January from the Missouri School of Mines and Metallurgy and was a member of the AFS student chapter there. He served with the Army Engineers in the recent war.

♦ ♦ ♦

Calvin P. Wolfe, foreman for several years of the annealing department, Eberhard Mfg. Co. Division, Eastern Malleable Iron Co., Cleveland, retired Apr. 1 after 54 years

CALVIN P. WOLFE

in the foundry industry. He was born Aug. 19, 1880 in Union Springs, N. Y. and began his apprenticeship at the age of 13. Following a period of 8 years as a molder in the foundry of McIntosh-Seymour Co., Auburn, N. Y., he was appointed foreman, Enterprise Foundry Co. Other supervisory positions later included Johnston Harvester Co., now the Massie-Harris Co., Batavia, N. Y.; L. J. Mueller Furnace Co., Milwaukee; Chase Foundry & Mfg. Co., Miller Foundry Co., and Ebco Mfg. Co., Columbus, O.; Docks Foundry, Three Rivers, Mich.; and Brown Industries, Sandusky, O. Education was gained through the Library Course, Worcester Polytechnic Institute; Harrington-Emerson Lecture Course on Industrial Efficiency; McLain's System; and the Alexander Hamilton Business Course. He was a resident of Milwaukee for 20 years and plans to return there to engage in activities outside the foundry.

♦ ♦ ♦

Sam Tour, chairman, Sam Tour & Co., New York, has been elected chairman of the Inter Society Corrosion Committee of the National Association of Corrosion Engineers, recently organized to promote co-operation among technical societies working in the field of corrosion. Mr. Tour also is president of the American Standards Testing Bureau and of Graphitized Alloys Corp., both of New York.

♦ ♦ ♦

J. P. Murphy, formerly in the magnesium technical service and development group, Dow Chemical Co., Midland, Mich., has been transferred to the magnesium sales staff of the company's Chicago sales office. Mr. Murphy was graduated from Yale University in 1942 and joined the staff of the Dow magnesium laboratory at that time.

♦ ♦ ♦

Dr. James T. Eaton, formerly manager of research, has been named director of research, E. F. Houghton & Co., Philadelphia, in charge of the company's research and control department. Dr. Eaton recently was named a director of Houghton & Co.

♦ ♦ ♦

F. C. Shafer, for the past 12 years vice president, Imperial Brass Mfg. Co., Chicago, and associated with the company 24 years, has been elected president and chairman of the board of directors. **C. H. Benson** and **J. T. Greenlee** have been named vice presidents. Mr. Benson is sales manager, distributor sales, and Mr. Greenlee is sales manager, original equipment sales for the company.

♦ ♦ ♦

George P. Eichelsbach Jr. has been elected vice president in charge of manufacturing, American Stove Co., St. Louis. Mr. Eichelsbach, who was formerly director of manufacturing, will continue as general manager of the company's plants in St. Louis, Indianapolis, Cleveland and Lorain, O., and as plant manager, St. Louis factory.

♦ ♦ ♦

L. C. Newton, 1931 University Ave., St. Paul, has been appointed sales engineering representative for the Aurora Metal Co., Aurora, Ill., and will handle the sale of aluminum-bronze and silicon-bronze vacuum die castings in Minnesota and northern Wisconsin.

♦ ♦ ♦

E. J. Basch, formerly associated with Doehler-Jarvis Corp., San Francisco, has joined Western Die Casting Co., Emeryville, Calif.

♦ ♦ ♦

Walther H. Feldmann has resigned as president, Electric Machinery Mfg. Co., Minneapolis, and has been named vice president in charge of sales of the parent company, Worthington Pump & Machinery Corp., with headquarters at the executive offices in Harrison, N. J. Mr. Feldmann was graduated from Baltimore Polytechnic Institute in 1915 and joined Electric Machinery Mfg. Co. in 1922.

♦ ♦ ♦

Changes have been announced in the sales department of Electro Metallurgical Division, Union Carbide & Carbon Corp., New York. **Herbert M. Rich Jr.** has been appointed vice president with headquarters in Pitts-

HERBERT M. RICH JR.

burgh, under direction of J. D. Swain, vice president in charge of sales. Mr. Rich, who recently was appointed general sales manager, joined the corporation in 1942 following 10 years with Hickman, Williams & Co., in Detroit. **W. H. Ferguson,** formerly sales representative in the New York area, has been named manager in the eastern seaboard and Birmingham areas. **Robert W. Crozier,** who has been engaged in ferroalloy activities, has been appointed a sales representative in the Pittsburgh area, with headquarters there.

♦ ♦ ♦

Burleigh E. Jacobs Jr. has been appointed sales manager, Grede Foundries Inc., Milwaukee. Mr. Jacobs joined the company as a molder at the Liberty division, Milwaukee, became coreroom superintendent at the Spring City division, Waukesha, Wis., works manager of the Iron Mountain, Mich., division, and works manager of the Milwaukee and Smith Steel divisions, Milwaukee.

♦ ♦ ♦

Joseph M. Beyvl has been elected a vice president, the Foundry Equipment Co., Cleveland. Mr. Beyvl, who joined the company in 1935, was appointed assistant to the president in 1942.

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Schuler Equipment Co.,
Birmingham, Alabama

Independent Foundry Supply
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Marthens & Co.
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Milwaukee Chaplet & Mfg.
Co., Milwaukee

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Frederic B. Stevens, Inc.
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FOUNDRY EDUCATIONAL FOUNDATION

Holds Third Annual Meeting

STEADY progress is being made in furthering the aims of the Foundry Educational Foundation. This was evidenced at the third annual meeting of the foundation held in Cleveland, May 8. Reporting on the foundation's activities, President Stowell Wasson, National Malleable & Steel Castings Co., said that during the last three years 268 one-year scholarships were awarded to 154 students at the engineering schools participating in the foundation program.

Graduating engineers who received scholarships and who have since entered the foundry industry total 73 to date, while an additional 135 engineering graduates who participated in the foundry courses of the foundation schools without benefit of scholarships, also have become identified with foundries. Summer employment in the industry was furnished to 296 foundry students.

It was emphasized at the meeting that the foundation's program is to be a continuous one. A drive for $400,000 to extend activities through the next three years currently is in progress, and more than $270,000 has been raised to date. This will permit an extension of the foundation's program to five more engineering schools, making a total of 12. None of the new funds will be used for equipping these schools at which the advanced foundry engineering courses will be taught.

The following trustees at large were elected at the meeting: James H. Smith, Central Foundry Division, General Motors Corp., Saginaw, Mich.; B. D. Claffey, Acme Aluminum Alloys Inc., Dayton, O.; C. R. Culling, Carondelet Foundry Co., St. Louis; James T. MacKenzie, American Cast Iron Pipe Co., Birmingham; G. J. Behrendt, Eastern Malleable Iron Co., Naugatuck, Conn.; Frank C. Riecks, Ford Motor Co., Dearborn, Mich. and Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va.

At the ensuing election of officers, trustees chose the following: Chairman, Stowell Wasson, the retiring president; president, Claude B. Schneible, Claude B. Schneible Co., Detroit; vice president, C. R. Culling, Carondelet Foundry Co., St. Louis; secretary-treasurer, Charles A. Barnett, Foundry Equipment Co., Cleveland. George K. Dreher continues as executive director.

CLAUDE B. SCHNEIBLE
President

In addition to the trustees at large, these trustees represent the foundation's six founding members:

Malleable Founders' Society — Anthony Haswell, Dayton Malleable Iron Co., Dayton, O., and Collins L. Carter, Albion Malleable Iron Co., Albion, Mich.; Gray Iron Founders' Society—John M. Price, Ferro Machine & Foundry Co., Cleveland, and Peter E. Rentschler, Hamilton Foundry & Machine Co., Hamilton, O.; American Foundrymen's Society — Stowell Wasson, and Fred G. Sefing, International Nickel Co., New York; Foundry Equipment Manufacturers Association—Claude B. Schneible and Charles A. Barnett; Non-Ferrous Founders' Society—George B. Hazen, Brass Foundry Co., Peoria, Ill., and Arthur Fischer, Fischer Castings Co., North Plainfield, N. J.; Steel Founders' Society of America—T. F. Dorsey, Fort Pitt Steel Castings Division, Pittsburgh, and Homer Tielke, Crucible Steel Casting Co., Cleveland.

It was pointed out at the meeting that one of the most important benefits being derived from the foundation program was not the original main objective. This is the stimulus given schools not formally in the program to improve their foundry laboratories and enlarge their foundry curriculum or electives. At the foundation's inception it was necessary to approach a number of schools to induce five to participate in the program; currently there is a greater demand than can be accommodated. However, as announced previously, five new schools are being added to the seven currently co-operating institutions. These are Michigan State College, Missouri School of Mines and Metallurgy, Ohio State University, Penn State College and Purdue Uni-

C. R. CULLING
Vice President

GEORGE K. DREHER
Executive Director

STOWELL WASSON
Chairman

CHARLES A. BARNETT
Secretary-Treasurer

versity.

As one indication of the extent to which foundation schools have supported the foundry program, it was reported that while the foundation has spent about $100,000 a year during its first three years, the 12 universities have spent or authorized the expenditure of $475,000 on their foundry facilities. In addition, each school has added at least one man (in several cases two) to their staffs to augment the teaching of the foundry courses.

AFS Convention

(*Continued from page* 75)

collectivism is a vanishing ability to explain the opposite philosophy—the free market economy, the voluntary society and a government of strictly limited powers. Unfortunately the majority of the people are inarticulate on these subjects. They don't seem to understand the relationships that must exist between persons and the state if freedom is to be at its maximum.

Welcoming Alumni Group members and guests to a dinner meeting in the Cleveland Athletic Club, Thursday night, past president William B. Wallis reviewed briefly the growth of the group since its formation with nine members in Cleveland in 1916. Each year has witnessed a steady growth in membership up to the present with 143 members. Of this group 91 were present, including two who attended the first meeting, W. H. McFadden and Benjamin D. Fuller. Group of past presidents at the speaker's table included Dr. G. H. Clamer, Philadelphia; W. R. Bean, Staunton, Va.; W. H. McFadden, Ponca City, Okla.; William B. Wallis, Pittsburgh; Maj. L. L. Anthes, Toronto; Benjamin D. Fuller, Cleveland; James L. Wick, Youngstown, O. Seated at either end of the same table were Robert E. Kennedy, secretary emeritus, AFS, and C. E. Hoyt, retired secretary treasurer of the society and for many years general manager of the exhibition and convention. Guests from foreign countries included Frank Hudson and N. P. Newman from England; R. Ronceray from France; J. L. Sissener from Norway and Sven Toresson from Sweden.

Responding to a request from the chair, Walton L. Woody, president-elect, AFS, outlined a proposed plan to build and equip an official headquarters for the society. Rented quarters constitute a heavy drain on the society's income.

Under the somewhat intriguing title "Taxes, Women and Hogs," Col. Jack Major, from Paducah, Ky., Suh, delivered a humorous, scholarly and at times bitingly critical discourse on the financial, political and domestic state of the nation under the present administration. In his frank and outspoken opinion the country has been on the greased skids for several years. Unless some radical and drastic changes are made in the near future, the present generation is in a hand-basket headed for the well known hand-basket destination.

MORE REPORTS NEXT MONTH

Space limitations prevent inclusion of reports on all technical sessions and additional views of the Foundry Show at the Cleveland convention in this issue. Other reports and illustrations will be presented in the July issue.

National Director E. N. Delahunt, Warden King Ltd., Montreal, presided at the Canadian dinner in Hotel Cleveland, Tuesday evening. Approximately 150 members of the various Canadian chapters and a number of guests from the United States and overseas joined in a thoroughly enjoyable and at times hilarious celebration.

At the speaker's table were: Alexander (Sandy) Dickson, chairman,

(*Continued on page* 122)

Group of Norwegian foundrymen at AFS Cleveland convention. Left to right, bottom row: Karl Stenstadvold, works manager, Foss Jernstoperi, Oslo; Gunnar Myhrvold, foreman, Hamar Jernstoperi; Torolf Krogvig, team secretary; John Sissener, team leader, consulting engineer; Knut Tronstad, Jotul og Kvaerner Ovnstoperi, Oslo; Birger Marthinsen, molder. Second row: Ragnar Olsen, molder; T. O. Jahren, pattern foreman, A/S Fredriksstad Mek. Verksted; Ragnar Brynildsbakken, chief engineer, A/S Strommens Verksted; Ivar Larsen, molder, A/S Myrens Verksted, Oslo; Harry Karlberg, fdr. supt., A/S Myrens Verksted; Erling Ernoe, manager, Kristiania Kunst og Metalstoperi, Oslo; R. Landmark, Allis-Chalmers; Oddleiv Kristiansen, molder, Raufoss Ammunisjonsfabrikker, Raufoss. Top row: Tonnes Tollefsen, molder, Sandnes Stoperi, Sandnes; Ragnar Astad, works manager, Sandnes Stoperi; Torkil Serigstad, foreman, Serigstad Mask. Verksted; Einar Johnsen, foreman, Jotul og Kvaerner Ovnstoperi, Oslo; Conrad Birkeland, works manager, Norwegian State Railway Co.

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(*Continued from page* 120)

British Columbia Chapter, Vancouver; Joseph Sully, Toronto, Ont., past AFS director and past chairman, Ontario Chapter; Jack King, Toronto, chairman, Ontario Chapter; R. E. Kennedy, secretary emeritus, AFS; Walton L. Woody, president-elect AFS; J. J. McFadyen, Galt, Ont., director-elect, AFS, and past chairman, Ontario Chapter; Ed Delahunt, Montreal, and AFS director; E. W. Horlebein, president, AFS; Walter L. Seelbach, Cleveland, vice president-elect, AFS; Noel P. Newman, president, Institute of British Foundrymen; James H. Newman, Montreal, chairman, Eastern Canada Chapter.

Chapter officers and directors held their dinner meeting Monday evening at Hotel Cleveland, with President Horlebein presiding. Ralph L. Lee, General Motors Corp., Detroit, the principal speaker, skillfully pointed out that the foundry must depend on humanics as well as efficient technical practices to be successful—a theme which he presents in more condensed form in his regular column in this issue.

NODULAR IRON DISCUSSED

At Two Joint Sessions

NODULAR iron was discussed at two joint meetings of the gray iron and malleable groups, and related to such phases as production problems, annealing or heat treatment, dilatometer studies and effect of section size.

First session was under the direction of Hyman Bornstein, Deere & Co., Moline, Ill., and Thomas E. Eagan, Cooper-Bessemer Corp., Grove City, Pa. In discussing production problems, Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va., said that selection of raw materials is important since sulphur, phosphorus, and manganese should be maintained at as low a level as possible. Care must be taken in adding the magnesium-containing alloy to insure effective results. He said that with hypereutectic irons there is a tendency toward carbon segregation or migration—the carbon floating to the cope side.

In the discussion Mr. Eagan said that designers and engineers are interested in obtaining 5 per cent elongation in the casting and not in the keel block test specimen which shows as high as 12 per cent. He said also that nodular irons under test exhibited double the bursting resistance and fatigue resistance of good gray irons. J. E. Rehder, Bureau of Mines, Ottawa, Canada, pointed out that nodular irons require good feeding to prevent microporosity, which he believes responsible for the lower elongation values sometimes found in castings.

Second paper, presented by Mr. Rehder, dealt with annealing of nodular iron, and pointed out that the relationships of time-temperature are similar for both nodular iron and malleable iron. Annealing time for nodular iron is not as long as for malleable iron due to high silicon content. Low manganese content is essential for minimum annealing time or for a ferritic structure as cast. Presence of some pearlite in the matrix does not seriously decrease the elongation of nodular irons, but if highest ductility is desired, the pearlite must be decomposed to an all ferritic structure.

In a written discussion Charles A. Donoho, American Cast Iron Pipe Co., Birmingham, stated that heat treatment of a 1 x 1-in. section from a keel block test bar at 1650° F for one hour and at 1350° F for one hour gave a structure containing 90 per cent ferrite. Richard Schneidewind, University of Michigan, Ann Arbor, Mich., pointed out that determination of the critical temperature of the iron is important to obtain minimum annealing time. He mentioned that a nodular iron containing 0.40 per cent Mn and 3 per cent Si becomes completely ferritic when held for 12 minutes in the range 1500 to 1475° F, while another iron containing 0.80 per cent Mn requires slow cooling for two hours from 1500 to 1350° F for the same result.

Concluding session on nodular iron had R. G. McElwee, Vanadium Corp. of America, Detroit, and V. A. Crosby, Climax Molybdenum Co., Detroit, as chairmen. First paper, describing dilatometer studies of two nodular irons differing only in silicon content, was prepared by N. A. Ziegler, W. L. Meinhart and J. R. Goldsmith, Crane Co., Chicago, and presented by Mr. Goldsmith.

Using step-bar specimens ranging in thickness from $\frac{1}{8}$ to 1 in., the data indicated that permanent growth produced by heat treating and associated with complete or almost complete graphitization in sections over $\frac{1}{2}$-in. is uniform and amounts to about 0.5 per cent of the linear dimensions. In thinner sections it rapidly increases and with $\frac{1}{8}$-in. section becomes as high as 1 per cent. Results also showed that graphitization best is achieved by holding at 1740° F for 2 hr followed by a holding period of 1½ hr in the range 1335 to 1155° F. The latter should preferably be divided into three equal steps at 1335, 1290 and 1240° F.

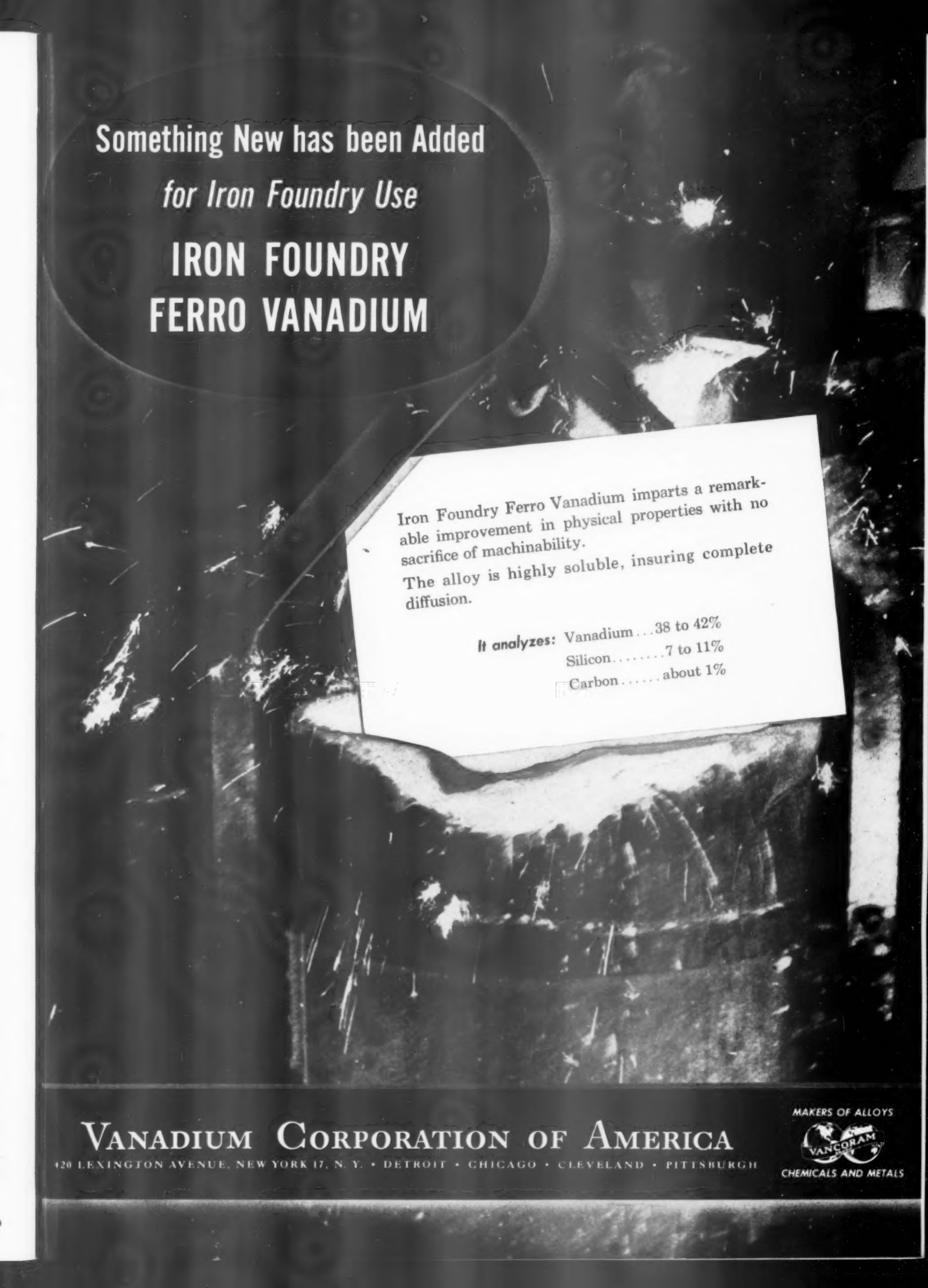
A written discussion by J. A. Rehder, Bureau of Mines, Ottawa, Canada, pointed out that the author's work indicated that heat treatment of nodular iron followed the same principles as annealing malleable iron. He disagreed with their remarks that phosphorus was not affected by magnesium and said that it can act as a dephosphorizer. In his opinion, the cooling rates employed were too fast, and tended to place graphitization of iron in the subcritical temperature range. Less time would be required if the specimens were slowly cooled through the critical range. W. W. Levi, Lynchburg Foundry Co., Radford, Va., said some work at his plant indicated that magnesium reacted with some phosphorus to form a compound in the iron in the as-cast state which gave low results in the phosphorus determination. However, annealing of the iron broke up the compound and made the phosphorus available for analysis.

Make Extensive Study

Concluding paper on "Nodular Iron Versus Section Size" by Gosta Vennerholm, H. Bogart and R. Melmoth, Ford Motor Co., Dearborn, Mich., was presented by Mr. Bogart. Using two types of pig iron—one a basic iron and the other a low-phosphorus iron—the authors made a number of heats of nodular iron with a range of magnesium contents from 0.025 to 0.09 per cent. Individual ladles were poured into a series of specimens 10 in. long and 1 x 1, 2 x 2, 4 x 4, 6 x 6, 8 x 8, and 10 x 10 in. in cross section. Test bars from the various specimens were used to determine the several mechanical properties such as tensile strength, elongation, impact resistance, etc., in the as-cast and heat treated condition.

In general the properties tended to decrease with the increase in magnesium content over 0.04 per cent and with increasing section size. Micrographs were shown of the various section sizes, and in the case of the heavier sections the graphite tended to appear in conglomerate form rather than in nodular form, and some flake graphite was present. Briefly it might be stated that the extensive investigation by Venner-

(*Continued on page* 124)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(*Continued from page* 122)
holm, Bogart and Melmoth stressed the need of exacting control in the production of nodular iron to obtain consistently high properties.

In the discussion James T. MacKenzie, American Cast Iron Pipe Co., Birmingham, questioned the method of determining magnesium content, stating he had found that it varies from top to bottom of a separately cast bar. Mr. Bogart said that he had only been able to obtain consistent results from separately cast chill bars. Richard Flinn, American Brake Shoe Co., Mahwah, N. J., asked if it was not probable that grain boundary constituents resulted in the formation of eutectiform graphite in some of the sections. Mr. Bogart replied that he thought so, but did not know what they were. Further work under consideration might reveal the cause.

FLUID FLOW RESEARCH REPORT

Features Aluminum Sessions

ALUMINUM and magnesium sessions were held during the first two days of the convention and consisted of five technical meetings and one luncheon. Eight prepared papers were presented. Opening session featured the research film, "Fluid Flow in Transparent Molds," sponsored by the Aluminum-Magnesium Division of the AFS and Battelle Memorial Institute, Columbus. This is the second progress report and motion picture on the research project. Commentary was by L. W. Eastwood, Battelle Memorial Institute.

R. F. Thomson, International Nickel Co., Detroit, presided, and C. E. Nelson, Dow Chemical Co., Midland, Mich., was co-chairman.

The film is in full color and is an outstanding piece of photographic work. It shows flow of water in three different designs of transparent Lucite molds. Red colored removable inserts are used to alter contours in the gates and runners of these molds for purposes of flow study.

Results of the study indicate that the least amount of air is carried into the mold cavity when the gating system is streamlined, eliminating sharp corners and abrupt changes in direction, to provide smooth flow of liquid. A sprue-runner-gate ratio of 1:4:4, with the runner cross section reduced as each gate is passed, produced the best results in the tests.

The best sprue design was shown to be a taper with the smallest area at the bottom. Furthermore, the small opening should be the least cross-sectional area possible which will permit filling the runners.

Sand molds were made in accordance with that design and poured in No. 220 aluminum alloy, containing 10 per cent magnesium. The resultant casting was almost perfect, according to Dr. Eastwood.

Discussion brought forth the comment that sand characteristics are as important as proper gating and the suggestion was made that moisture be held to 5 or 6 per cent and permeability to 12 to 20. It also was suggested that overheating of the metal be avoided and that molds be poured carefully.

Another commenter stated that aspiration of air is not necessarily detrimental in aluminum practice unless turbulence is present. It was stated further that water flow is not the same as metal flow in molds, being more sensitive, particularly in the formation of a vortex in the sprue. It also was stated that air entering the drilled vent holes in the Lucite molds may have more effect on the fluid in the mold than the millions of tiny holes present in a sand mold. Permeable sand would permit more gentle aspiration of air and the air might form a thin layer between mold wall and fluid instead of mixing with the metal.

The author of a prepared discussion attempted to prove mathematically and through application of the laws of physics that the tests shown on the film are sound in theory.

Another point brought out was that an important factor in gating practice is to dissipate the kinetic energy of metal poured into a mold. If passages are restricted to keep a head of metal and thus keep the passages filled, then it is possible that the metal stream might have a jet effect which would carry sand into the mold cavity. This would cause just as much trouble as air bubbles and dross in the metal.

"Test Bar Gating" was discussed at the roundtable luncheon, Monday. Walter Bonsack, Christiansen Corp., Chicago, presided, and H. J. Rowe, Aluminum Co. of America, Pittsburgh, was co-chairman.

First paper at the second session was "Magnesium Foundry Practice in Canada" by M. W. Martinson and J. W. Meier, Bureau of Mines, Ottawa, Canada. Presented by Mr. Martinson, it outlined development of the magnesium casting industry in Canada from its inception in 1915 to the present.

Chairman of the meeting was M. E. Brooks, Dow Chemical Co., Bay City, Mich. E. J. Vargo, Wellman Bronze & Alumium Co., Cleveland, was co-chairman.

One of the most important advances made in magnesium alloys in recent years, according to Mr. Martinson, has been the improved corrosion resistance of casting alloys realized by limiting such impurities as iron, nickel, copper, phosphorus, and others. Contrary to the practice in this country, Canadian foundries prefer the low zinc type alloys because they are considered easier to cast and more reliable.

In discussing sand he said that until recently, Canadian foundries used sand imported from this country at a cost of $4 to $8 more per ton than they are now paying Canadian suppliers. All magnesium foundries in Canada use synthetic sand mixtures based on washed and dried subanglular silica sand of AFS fineness 65 to 70. Only sulphur and boric acid type inhibitors are used. Generally, the bond is 50:50 western and southern bentonite, and the diethylene glycol is used to prevent the molds from drying out too rapidly.

Use Multiple Gates

Canadian core sand practice involves use of a mixture incorporating a base silica sand of AFS fineness 65 to 80, urea formaldehyyde in conjunction with a dextrine-type cereal binder, and the customary inhibitors, sulphur and boric acid.

A number of practical rules for gating have been evolved by Canadian foundries: Castings should be filled through multiple small gates rather than a few large ones; cross-sectional area of gates should approximate the cross-sectional area of runners; the runner should be greater in depth than width and should extend beyond the last gate, except that in a ring runner extending completely around the casting the gates should be uniformly distributed around the circumference and should slope backwards into the casting; metal should be choked in the sprue.

With regard to refining, the latest Canadian practice is to combine grain refinement and degassing by use of hexachlorethane additions. Surface oxidation during solution heat treament is prevented by using either sulphur dioxide or pyrite. No protective atmospheres are used during stabilizing or aging treatments.

During the discussion period it was stated that too much adverse com-

(*Continued on page* 126)

Brief Notes for Busy Foundrymen

Which Is It?

Is it a blow, a cold shut, a misrun, or was it poured short? It could be any one and yet be improperly identified. After the gates are removed, what is it? Often when a side floor pattern is placed on the mechanized line such a defect may appear. For example, say a small thin casting that contains one, two, or three small oil sand cores is showing a high loss said to be a "blow". There are eight of these castings on the runner and the in-gate is small. One pin core in these castings is farthest from the runner and the surrounding metal in a thin section. It is said that these cores are "blowing".

On the side floor the molder does his own pouring. What is the difference between the floor molding and the line molding? Naturally bonded sands are used on the side floor, synthetic sands on the mechanized line. The line sand is rammed hard, the side floor naturally bonded sand is rammed soft. Why? The side floor molder pours his own floor, the line molder doesn't. Everything is poured in the same manner—hard and fast. The side floor molder has learned that hard ramming produces "blows" or "misruns", as the sand becomes too "dense" and "too tight" for the core gas to escape. He also found that if he rams "soft" the metal will penetrate unless he "pours soft".

What does he do? In order to prevent penetration, rough casting, fissures and fines from hard pouring—he cuts a small sprue. He reduces ferrostatic pressure. He pours very close to the mold. He "chokes" the pouring. Therefore, the soft ramming allows the core gasses to escape better, and the soft pouring prevents rough casting surface. On the line, the hard ramming doesn't allow the core gasses to escape properly, and soft ramming cannot be allowed as everything is poured in the same manner—hard. In order to obtain good finish, the molds must be rammed hard.

What then must we do? First, relieve the trouble. If the core gas is causing backward pressure, vent the cores to the parting line. Put the vent on the pattern. Second, increase the cope to exert more pressure. Third, increase the size of the sprue. Fourth, raise the ladle slightly to increase ferrostatic pressure further. Probably the core venting will be sufficient, but one of the others will also help.

Remember—hard ramming and finer sands to give better finish mean fewer voids to accommodate core gas—or any mold gas. Venting is essential. Vent to the parting line. Sand composition—ramming—pouring—venting—all go together. Do not change one without considering the others!

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(*Continued from page* 124)
ment is devoted to the corrosion of magnesium castings. It was pointed out that high-purity and high-zinc magnesium alloys have high resistance to atmospheric corrosion although they are corroded by salt water.

A. J. Juroff, Bendix Products Division, Bendix Aviation Corp., South Bend, Ind. (presently with Duramold Castings Inc., Mishawaka, Ind.) presented the second paper, entitled "Equipment for Degassing Magnesium Alloy Melts."

Mr. Juroff described a portable piece of degassing equipment consisting of a cylinder of chlorine mounted on a rubber-tired cart. The gas is led through a shutoff valve, copper tube, needle valve, and Neoprene hose to a carbon diffuser. Degassing time is 5 to 10 minutes and the average amount of gas used is in the ratio of 0.04 lb chlorine to 1 lb magnesium. The most effective temperature for degassing is 1330 to 1360° F. In Mr. Juroff's opinion, the fluidity of magnesium melts is more consistent with the chlorine refinement method.

One of the difficulties encountered with the degassing equipment described was failure of the carbon tube due to rough handling. This was eliminated by encasing the tube in an iron pipe.

During discussion the question arose as to the danger of wheeling a tank of chlorine too close to molten magnesium, thus causing pressure build-up in the tank due to heat. It was stated that a properly insulated furnace, use of good judgment in placing the tank and pressure relief plugs on the cylinders make the operation as safe as any others.

Questioning brought forth the statement that the diameter of the carbon tube is not critical. An inside diameter of ½ to ⅞-in. is satisfactory. Another point brought out was that metal equipment for handling chlorine should be cadmium plated to avoid corrosion. As to why more consistent fluidity is obtained by the chlorine treatment, Mr. Juroff stated that the oxides are more completely removed by the process. Magnesium chloride is considered one of the best gas removal agents. Use of the process, however, increases melting loss about 1 per cent.

At the third aluminum and magnesium session, R. E. Ward, Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, N. J., presided, and W. E. Carver, Light Metals Inc.,
(*Continued on page* 128)

Non-Ferrous Founders' Society Holds Son-Father Dinner

OVER a hundred foundrymen, fathers, sons, sons-in-law, daughters and wives attended the Son-Father Dinner of the Non-Ferrous Founders' Society held Monday evening, May 8, at the Cleveland Athletic Club. Co-chairmen Alex Cadman and Arthur Fischer welcomed the fathers and guests. Members of the Brass Foundry Productivity Team of Great Britain brought a new color-sound film with them and Frank Hudson team captain, handled the premier showing in this country. Made primarily to interest young Britishers in a foundry career, the film served to illustrate British methods and operation to members and guests.

The evening's highlight was presentation of prizes to A. E. Jacobson, Grand Haven Brass Foundry, Grand Haven, Mich., who brought his three sons—all foundrymen, and to Lee Schneider who attended the dinner with his father and grandfather. In contrast with British family associations in the foundry industry which extend over periods of 600 years, three and four generations are nearer the United States pattern.

During a roundtable survey of paternal representatives in the industry, Holly Wellman, Wellman Bronze & Aluminum Co., Cleveland, pointed out that his father built the first open-hearth steel furnaces in this country after the British specifications of Charles and Frederick Siemens. The foundryman having the most sons in the business was announced as Arthur Lanctot Sr., who with his sons Lionel, Albert, Raymond, George, Roland, Gerard and Arthur Jr., together with sons-in-law, operate the Parker's Brass Foundry in Woonsocket, R. I. In closing the meeting, Mr. Fischer said a course had been set by the fathers, for the younger generation.

A survey of business conditions, made during the board meeting of the society on May 7, indicated that in all sections of the country business was approximately 30 to 40 per cent above that of 1949. The sharp upturn has resulted in an acute lack of skilled help.

Shown at the dinner, Fig. 1, left to right, are: Arthur, William and Lee Schneider, Western Bronze & Brass Foundry, Denver, representing three generations of foundrymen. Fig. 2—General view at the dinner. Fig. 3—Chester F. Faunt, Christensen & Olsen Foundry Co., Chicago, past NFS president; Ruth Windsor, assistant secretary-treasurer, NFS, and J. D. Zaiser, Ampco Metal Inc., Milwaukee, society vice president. Fig. 4—A. E. Jacobson, Grand Haven Brass Foundry, Grand Haven, Mich., receives plaque for having most (3) foundrymen sons at the dinner

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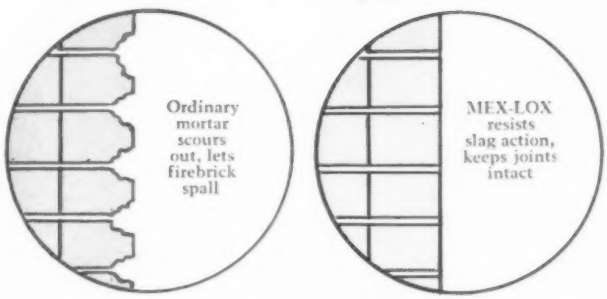

Slag and molten metal destroy ordinary mortar and weaken firebrick joints. Brick soon spalls and must be replaced.

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(*Continued from page* 126)

Indianapolis, acted as co-chairman. Results of recent investigations were described in a paper, "Characteristics of Some Aluminum-Zinc-Magnesium-Copper Casting Alloys," by Walter E. Sicha and H. Y. Hunsicker, assistant chiefs, Research Division, Aluminum Research Laboratories, Aluminum Co. of America, Cleveland. Two new compositions of these alloys had been selected. A612, a sand casting alloy—having the nominal composition, 6.5 per cent Zn, 0.7 per cent Mg, 0.5 per cent Cu and 0.15 per cent Ti—was discussed by Mr. Sicha. The alloy designated C612—containing 6.5 per cent Zn, 1.0 per cent FE, 0.5 per cent Cu, 0.35 per cent Mg and 0.10 per cent Ti—and discussed by Mr. Hunsicker, has sufficient resistance to hot cracking to permit production in permanent molds of castings that are not extremely intricate in design.

Good combinations of tensile properties for nonheat-treated aluminum alloys are produced in these alloys by natural aging. A suitable artificial aging treatment may be applied to alloy A612 for more rapid attainment of specified tensile properties. Standard accelerated tests have indicated that these alloys are resistant to corrosion and to stress-corrosion cracking.

Both alloys exhibit excellent brazing characteristics and are used for castings in brazed assemblies. Mechanical properties and resistance to corrosion are not impaired by conventional brazing treatments at temperatures up to 1120° F, and are satisfactory after elevated temperature treatments which may be employed for aging wrought components of brazed products.

Discussion following the presentation was spirited and critical. Prepared papers described results of similar tests made at Solar Aircraft Co., Des Moines, Iowa, and Sperry Gyroscope Co., Great Neck, N. Y., and disclaimed advantages to be gained by replacement of chromium with copper. Mr. Sicha explained that no two of these alloys are absolutely similar but explained advantages of the new compositions.

The second paper, "Corrosion and Stress Corrosion Properties of a High Strength Aluminum-Zinc-Magnesium-Copper Casting Alloy," by R. A. Quadt and E. C. Reichard, research metallurgists, Federated Metals Division, American Smelting & Refining Co., Barber, N. J., was presented by Mr. Reichard. Data represented part of a program of research by the company. A high-strength, self-aging, sand-cast aluminum alloy containing 7.5 Zn, 0.8 Cu and 0.4 Mg had been subjected to various corrosion and stress corrosion tests in 3 per cent aerated sodium chloride solution. In immersion tests the alloy showed good resistance to attack—equivalent to the A1-5 Si composition that is commonly employed where good corrosion resistance is required.

Specimens simultaneously corroded and stressed were unaffected by loads up to 80 per cent of the specimen yield strength. Beyond a threshold value located between 80 and 90 per cent of the specimen yield strength, stress corrosion cracking occurred. As a result of the high yield strength enjoyed by this alloy, some specimens stressed as high as 24,000 psi showed no loss in tensile properties caused by the combined action of stress and corrosion.

In subsequent discussion, stress corrosion tests conducted at Sperry Gyroscope Co. were compared with the tests as described in the paper. The conclusion was drawn that any metal or alloy has critical environments in which they are subject to corrosion. It was suggested by Walter Bonsack, vice president-director of research, Christiansen Corp., Chicago, that it is not astonishing that we have alloys that are overlapping. All of the alloys under discussion have faculties of aging at room temperatures.

British Exchange Paper

S. C. Massari, AFS, Chicago, presided at the fourth aluminum and magnesium session. Hiram Brown, Solar Aircraft Co., Des Moines, Iowa, was co-chairman. At this session the official exchange paper from the Institute of British Foundrymen was presented by the author, Frank Hudson, Mond Nickel Co., London. It was entitled "Aluminum Alloy Castings—A Review of British Achievement."

According to Mr. Hudson, British production of aluminum castings is 45,000 tons per year, of which 51 per cent is composed of gravity die castings (permanent mold castings), 35 per cent sand castings and 14 per cent pressure die castings.

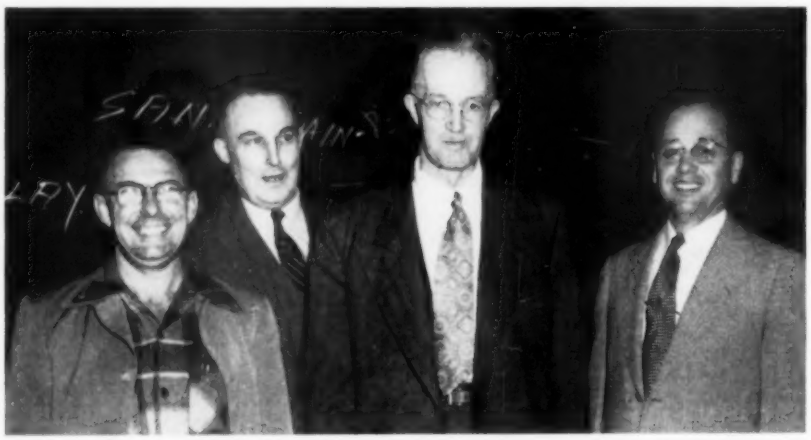
He described the development of various alloys in Britain, stating that one developed over 30 years ago still is used extensively for special purpose applications. Its nominal composition is 4 per cent copper, 2 per cent nickel, 1.5 per cent magnesium and the balance, aluminum.

In describing metallurgical developments, he stated that probably the best way of minimizing hydrogen absorption in aluminum alloys is to maintain a thin, unbroken oxide film on the molten metal surface during melting.

For degassing, most British foundries use nitrogen or hexachloroethane. The latter is an organic compound which evolves chlorine when heated to aluminum melting temperatures. Gas removal also has been effected by treatment with titanium tetrachloride and boron trichloride. In addition to removing hydrogen, they promote grain refinement.

He also covered fluxing and grain refinement, saying that the most im-

(*Continued on page* 131)



SAND SCHOOL: Harry L. Dietert, Harry L. Dietert Co., Detroit, conducted his sand school Mar. 20-23 at University of California, Berkeley, Calif. Total attendance for the four nights was 396. Shown at the school, left to right, are: Norman E. Schlegel, Vulcan Foundry Co., Oakland, Calif.; Harold E. Henderson, H. C. Macaulay Foundry Co., Berkeley, Calif.; George W. Stewart, East Bay Brass Foundry, Richmond, Calif., and Mr. Dietert. Photo by Samuel D. Russell, Phoenix Iron Works Co.

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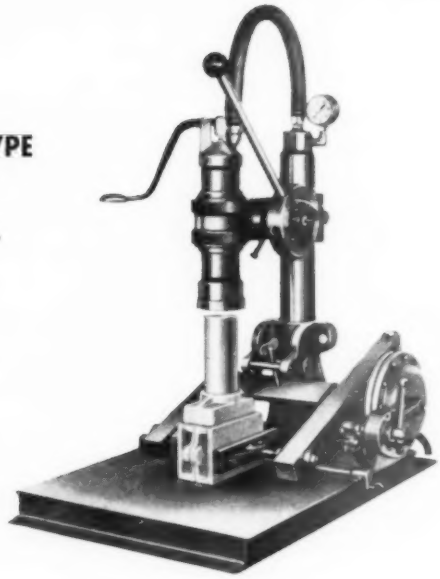

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(*Continued from page* 128)

portant effect of grain refinement is in promoting more uniform properties throughout the casting rather than attempting to obtain high strength values only. British foundrymen use titanium additions of up to 0.3 per cent and niobium additions of up to 0.1 per cent. He cautioned against using excessive grain refinement additions because loss of ductility properties may result.

Regarding pouring and running methods he advocated multiple gating systems, the use of choke gates to avoid carrying dross into the mold, the use of chills and heavy feeding risers, and the avoidance of turbulence.

When questioned about the use of niobium for grain refinement, Mr. Hudson stated that about 50 per cent of the foundries use it and 50 per cent use titanium. It is introduced into the metal as an addition alloy of aluminum and niobium. Pre-alloyed ingots containing niobium also are available from British suppliers. Mr. Massari pointed out that niobium production and distribution is controlled by England, and that might account for its comparative scarcity in the United States.

Chairman of the fifth session was R. T. Wood, American Magnesium Corp., Cleveland. J. C. McDonald, Dow Chemical Co., Midland, Mich., was co-chairman.

The first paper, "Casting of Magnesium-Rare Earth-Zirconium Alloys in Sand," by K. E. Nelson and F. P. Strieter, Dow Chemical Co., was presented by Mr. Nelson.

Develop New Alloy

Mr. Nelson stated that developments in the field of aircraft engines are toward higher operating temperatures. Consequently, materials used in these engines must have good properities at these temperatures. Because strength-weight ratio is important, magnesium has been used successfully for a number of years. Most of the alloys used have been from the magnesium-aluminum-zinc system and are unsuited for stress applications above 300° F because their resistance to creep decreases as operating temperature increases. A new system of alloys which possess improved characteristics in this respect has been developed. These are the magnesium-rare earth-zirconium alloys.

During experimental work a composition was selected for development as a commercial sand casting alloy. It is designated EK30 and contains 2.0 to 4.0 per cent rare earth and 0.1 to 0.4 per cent zirconium. Its room and elevated temperature properties are comparable to other compositions within this system of alloys, and it can be handled in the foundry by the same general practice used for other commercial magnesium casting alloys. Subsequent field tests of engine parts cast in EK30 alloy have proved successful.

Concluding paper was entitled "Development of High-Strength Magnesium Casting Alloy ZK61," by J. W. Meier and M. W. Martinson, Bureau of Mines, Ottawa, Canada. Presentation was by Mr. Meier.

The speaker pointed out that one of the most important aims of magnesium alloy research is the creation and development of alloys with increased strength-weight ratio, showing reasonable corrosion resistance and good workability. In Mr. Meier's opinion, slight progress has been made in the commercial use of any new alloys. However, the authors of this paper have done some work on a new alloy, and this paper presents results of the experiments. The alloy is ZK 61, which contains 6.0 per cent zinc and over 0.7 per cent zirconium.

Results of the investigation indicate that optimum mechanical properties in the as-cast and heat-treated condition are obtained with this alloy. Use of high-purity magnesium in its production permits the use of a fused chloride mixture as an alloying agent for introducing zirconium without excessive flux inclusions. Use of high-purity magnesium also gives a higher alloying efficiency because less zirconium is lost due to settling out impurities.

When the alloy is aged at room temperature without prior heat treatment, a combination of mechanical properties superior to those of standard magnesium casting alloys in the fully heat treated condition is obtained. A comparison of mechanical properties of various ferrous and nonferrous casting alloys shows that the newly developed ZK 61 magnesium casting alloy has the highest strength to weight ratio found in any other commercial casting alloy.

HEAT TRANSFER EXPERIMENTS

Reported in Two Papers

THE paper, "Solidification of Ingots," by Dr. B. H. Alexander, Sylvania Electric Products Inc., Bayside, L. I., N. Y., in addition to the progress report of the heat transfer research project under the direction of Dr. V. Paschkis, Columbia University, New York, was featured at the heat transfer session of the society. Dr. H. A. Schwartz, National Malleable & Steel Castings Co., Cleveland was meeting chairman and E. C. Troy, foundry engineer, Palmyra, N. J., was co-chairman.

Dr. Alexander's study was based on the dumping of duralumin ingots from molds 2.4 in. square and 6 in. square. The alloy was poured rapidly into the mold, which in all experiments was held at room temperature. It took five seconds to fill the larger mold and two seconds for the smaller one. After holding for a determined length of time, the mold was overturned and remaining liquid poured out. The crust remaining was sectioned vertically and the thickness measured at mid-height of the column.

In charting the results of these experiments, Dr. Alexander found that solidification curves of ingots do not obey Field's equation over the whole range of freezing. In the later stages there is a deviation resulting in a more rapid rate of freezing than would be expected according to Field's equation. Overheating of the liquid metal before pouring causes a delay in the beginning of freezing and an increase in the time necessary for complete solidification. And, in the speaker's opinion, the dumping method does not give a measure of the volume or mass velocity of freezing for ordinary metals and alloys encountered in the foundry.

There followed comments by Dr. W. S. Pellini of the metallurgy division of the U. S. Naval Research Laboratory, Washington; Dr. Clarence Sims, Battelle Memorial Institute, Columbus, O., and by B. F. Brown, research associate, Massachussetts Institute of Technology, Cambridge, Mass.

Dr. V. Paschkis, technical director of the heat and mass flow analyzer laboratory of Columbia University, then presented the report on "Influence of Dry Sand Conductivity on Rate of Freezing of Steel Slabs." Dr. Paschkis pointed out that these studies are carried out with an electric computing machine in which various properties can be studied under varying operating conditions. Results of the study ultimately will enable foundrymen to select casting sands on the basis of their conductivity properties.

The work on which this report is based was completed about six months ago and present experiments are concerned with sands containing moisture. That report will be ready for presentation at next year's meeting.

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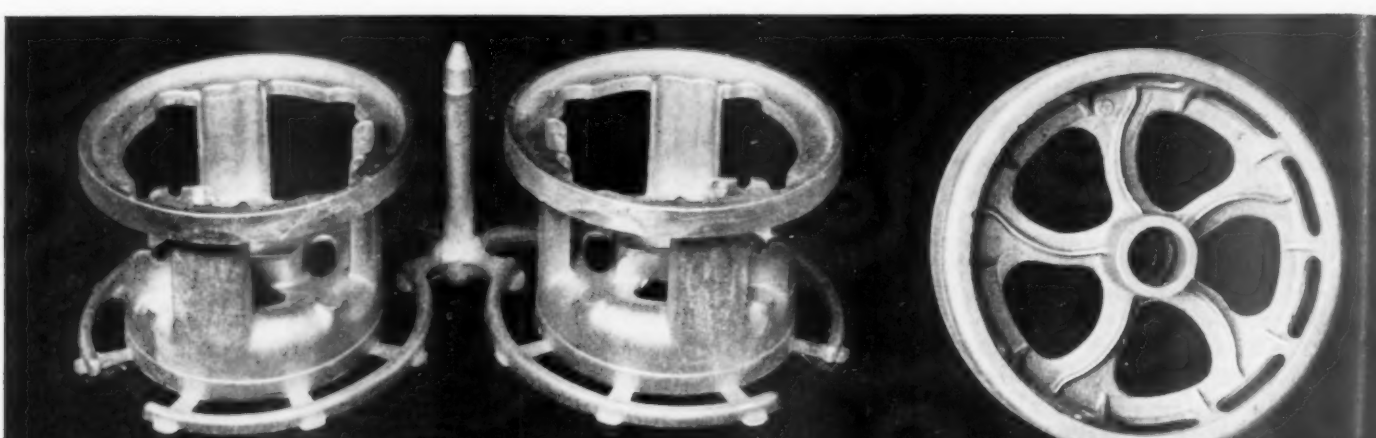

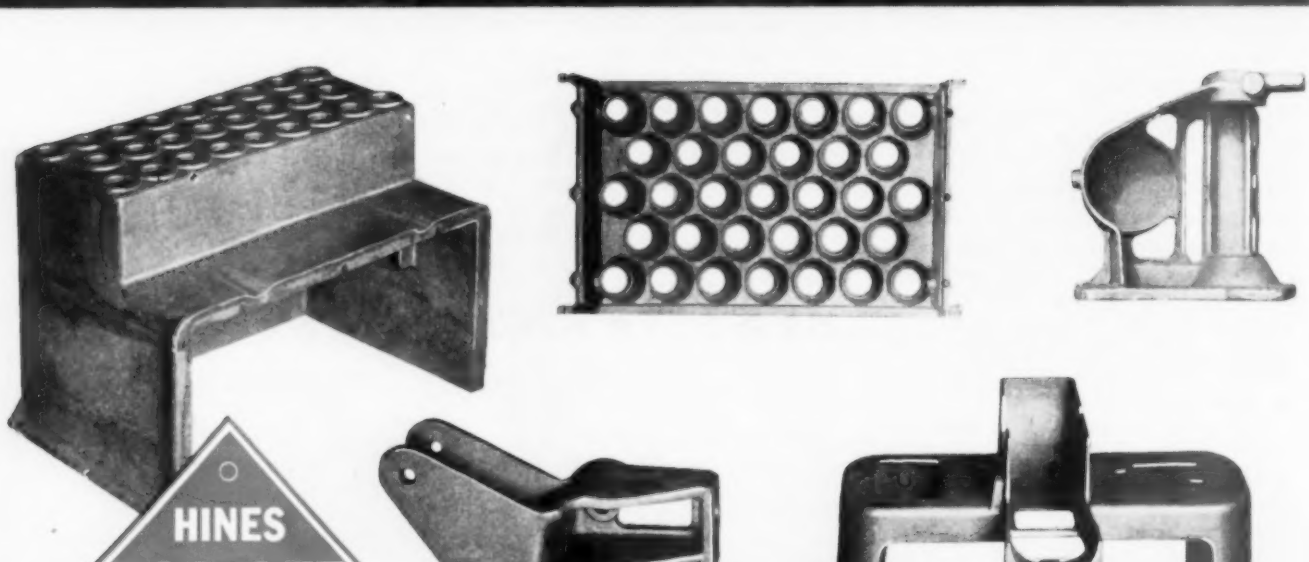

HINES
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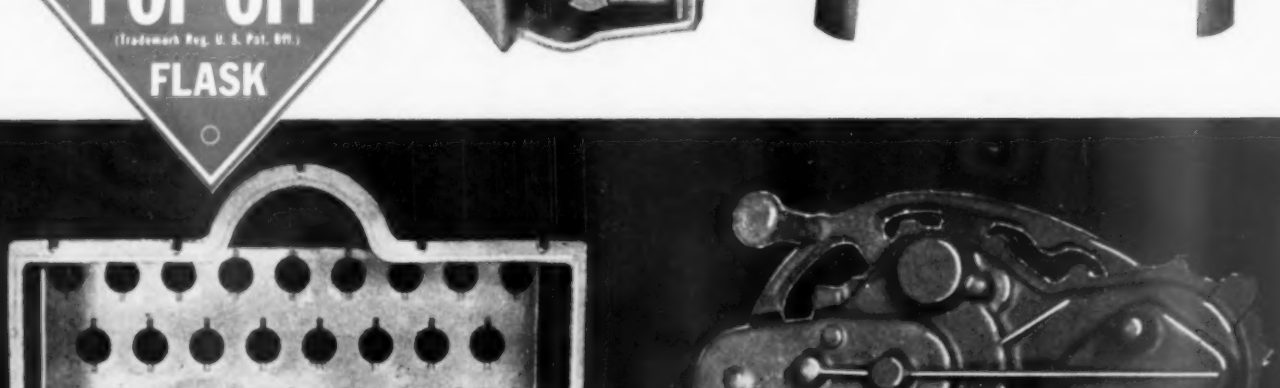
FLASK



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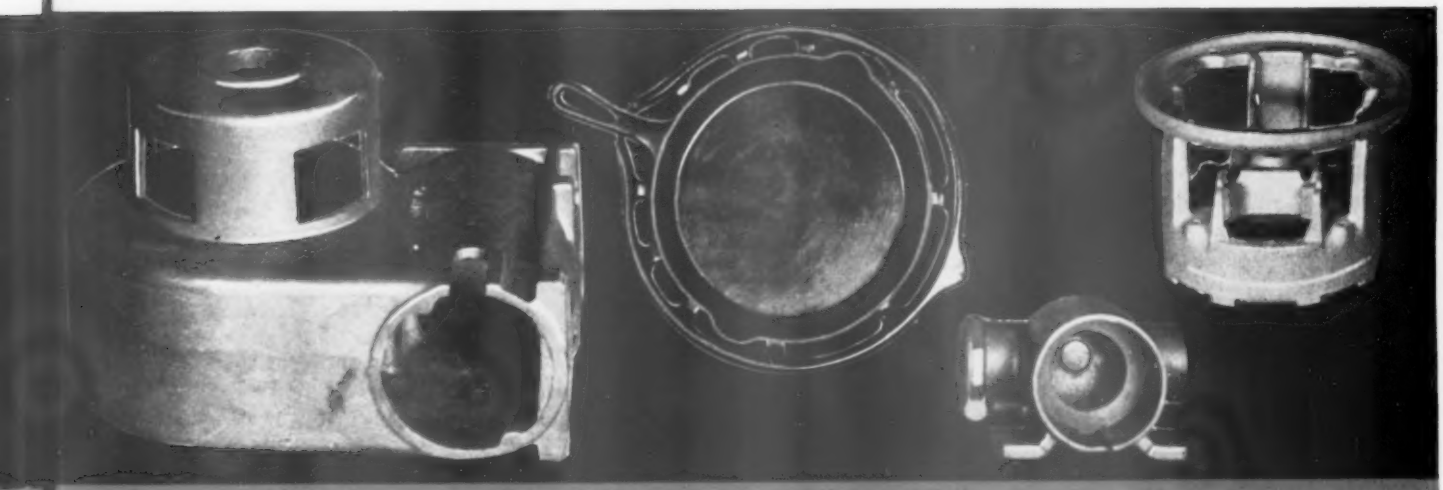
HINES

POP-OFF

FLASKS

Lowered Costs and Raised Production on these jobs....

Just a few examples of castings formerly made in snap flasks and tight boxes now being made in Hines Pop-Off Flasks at a greater saving.



S FLASK CO.

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(*Continued from page* 131)

The dry sand studies indicate that dry sands are a negative chill; that the conductivity of the sand nearest the metal surface is of greatest importance; and the sands of low conductivity have greatest influence on casting solidification.

S. L. Gertsman, Canadian Bureau of Mines, Ottawa, Ont., inquired what practical purpose to foundrymen is to be gained in studying low conductivity properties of sands. Chairman Schwartz replied that the heat transfer committee is interested, of course, in obtaining data which will be of practical help to foundrymen in meeting casting problems, but they also are interested in obtaining data on basic principles of heat flow. Dr. Paschkis pointed to the advantage of computing values. It is possible by this means to find out which variables are important in foundry practice and which deserve no further consideration.

BRASS AND BRONZE DIVISION

Sponsors Interesting Program

BRASS and Bronze Division sponsored a convention program consisting of three technical sessions, a two-part nonferrous shop course and roundtable luncheon followed by a business meeting. Good attendance and lively interest sparked all of these events.

Presiding at the first technical session was J. J. Curran, Walworth Co., Greensburg, Pa., assisted by A. K. Higgins, Allis-Chalmers Mfg. Co., Milwaukee, as co-chairman. Initial paper, "An Investigation of Melting and Casting Procedures for High Purity Nickel," was presented by Douglas W. Grobecker, Los Alamos Scientific Laboratory, Los Alamos, New Mex. This reported a program initiated for development of nickel casting procedures, since a quantity of such castings were required for experimental investigations. Maximum purity and a freedom from defects were requisites.

The procedure worked out gave sound castings containing 99 per cent nickel—2 per cent higher purity than commercially pure nickel castings. Induction electric furnaces lined with monolithic sillimanite were found suitable for melting. To obtain nickel suitable for pouring defect-free castings, it was necessary to melt under highly oxidizing conditions, boil the melt thoroughly, and deoxidize with carbon, manganese, aluminum and magnesium. The most desirable slag was formed during the melting period by coagulation of oxidized impurities, eroded sillimanite lining and excess nickelous oxide.

The speaker stated that scrapped castings, heads, gates and processed machine turnings could be remelted as a portion of a subsequent charge without appreciably lowering purity of the metal or causing gas defects. Pouring temperatures were critical and the metal was poured at the lowest temperature at which formation of cold shuts and cavity defects could be avoided. Use of lampblack as an insulating cover for the feeder head was necessary to avoid excessively deep piping.

Use of uncoated graphite molds was unsatisfactory, Mr. Grobecker pointed out, a reaction between the molten metal and the graphite producing severe gas defects. Graphite molds coated with magnesia, however, gave some satisfactory castings, but generally were subject to deep pinhole defects on the outer surface. Castings made in properly prepared sand molds were generally free from defects. It was stated that nickel melted and cast by the described methods showed a slight tendency to be brittle. However, this lack of ductility was not severe, and castings of the desired shapes could be cast in sand molds.

A paper on "Metal Melting—Application of Thermodynamic Principles to Melting Nonferrous Metals," by Robert I. Moore, Wilson Brass & Aluminum Foundry Co., Toronto, Ont., dealt with heat losses in crucible furnaces through radiation, conduction and convection. The largest portion lost is that heat rejected in the exhaust gases, Mr. Moore declared. Actually, 90 to 97 per cent of the heat in the fuel is lost in the melting process.

Means whereby higher efficiency could be achieved were given in the paper and actual efficiencies resulting from proposed conditions were calculated. Selection of furnace wall materials, wall thickness, flame temperatures and furnace wall surface can be made to insure most efficient furnace operation for given conditions of exhaust gas temperatures. However, the high loss occasioned by rejection of products of combustion at relatively high temperature, Mr. Moore stated, justifies investigation of the possibility of utilizing exhaust gases for preheating purposes down to temperatures within 200 or 300 degrees of standard atmospheric temperature. Extensive experiments would have to be carried out to reach the economic compromise between the theoretical concepts established and their practical application.

Some of the discussion of Mr. Moore's paper centered around feasibility of utilizing waste heat from melting furnaces to heat the foundry. One commentator said that his plant has been utilizing waste heat satisfactorily in this fashion. Waste heat from the melting furnaces is collected in a central hood and vented through a pipe through the roof. Around this pipe is an outer shell into which outside air is drawn in, heated and injected into the shop by a blower driven by fractional horsepower motor. The installation cost $2000 and it saves $700 in heating fuel per year.

Program for the second brass and bronze session consisted of a paper and a research project progress report. George J. Barker, University of Wisconsin, Madison, Wis., presided, and Harold J. Roast, consultant, Westmont, Quebec, was co-chairman.

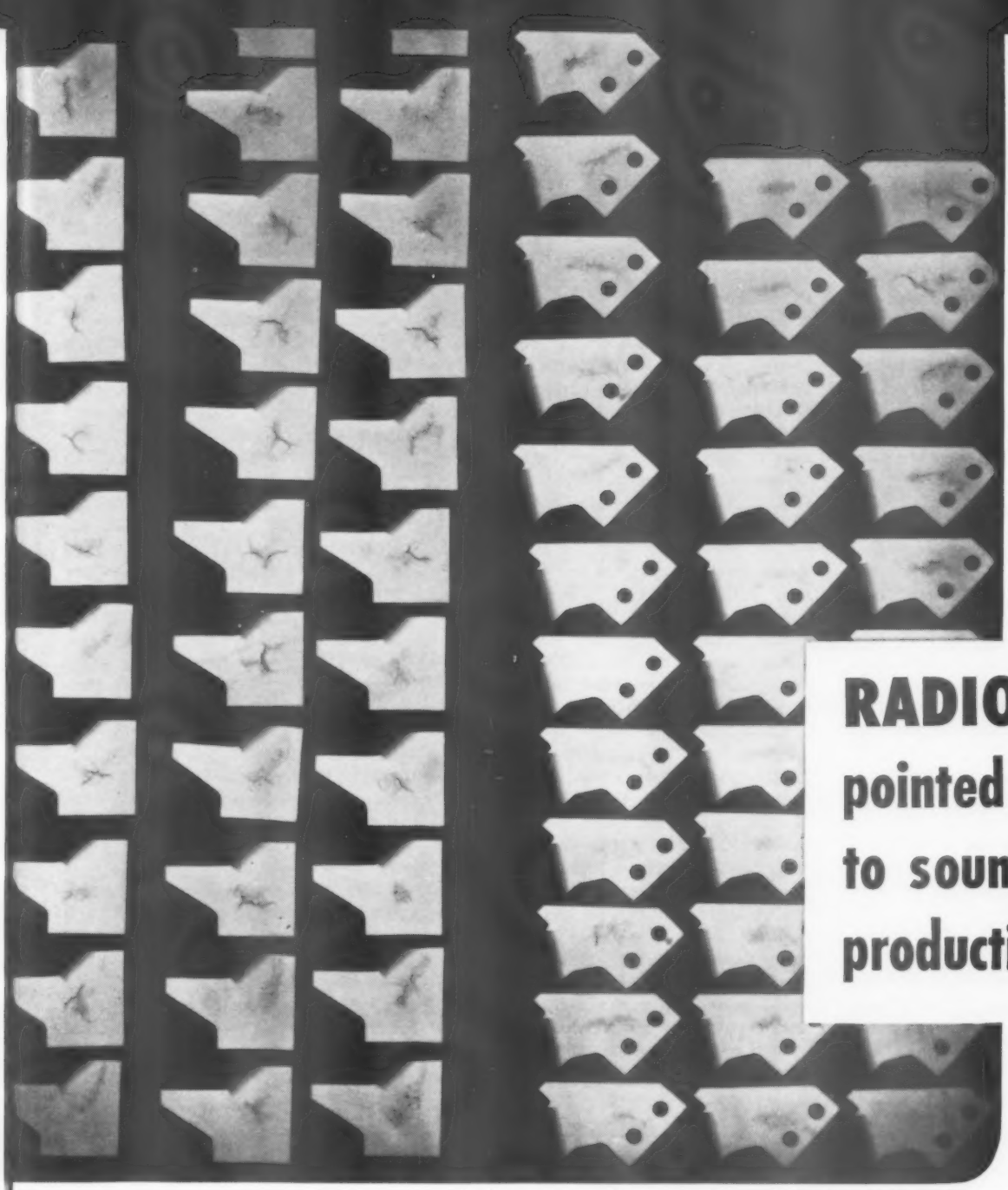
Long Solidification Range

The paper, "Effect of Superheating and Casting Temperatures on Physical Properties and Solidification Characteristics of Tin Bronzes," was authored by Bernard N. Ames, senior metallurgist, and Noah A. Kahn, principal metallurgist, Material Laboratory, New York Naval Shipyard, and presented by the former. Tin bronzes are susceptible to an interdendritic type of microshrinkage often resulting in defective castings under hydrostatic pressure test, particularly if benefits derived from the as-cast skin are removed by machining. It is generally believed that this condition is due in part to the long solidification range of this class of alloys and its mode of solidification, which makes adequate feeding of molten metal to the interdendritic voids quite difficult. Of course, this condition is further aggravated by higher gas contents in the alloy.

The Navy Department has sponsored a project to investigate this phenomena and to develop methods and techniques for its control. The current paper reported on one phase of the work.

The authors demonstrate effect of superheating and casting temperatures with and without phosphor-copper deoxidation on tensile strength, ductility, macrostructure, microstructure, density and pressure tightness of Navy gun metal. Results indicated that when proper melting atmospheres are employed, degree of su-

(*Continued on page* 136)



RADIOGRAPHY pointed the way to sound production

Radiography revealed a recurring irregularity in a simple production casting—showing the need for a change in casting procedure.

Simple castings are not always soundly made the first try. These were for a customer who had learned to expect highest quality from the foundry.

The first group cast was checked radiographically. Similar irregularities were found in nearly every part, indicating the need for a change in casting procedure. With the help of radiography the change was made with a minimum of lost time, and sound parts were quickly cast and delivered to the customer.

Any foundry that seeks a reputation for producing consistently sound castings will find radiography an invaluable aid. It detects irregularities. It pictures the effects of changes in gating, venting, pouring temperatures, chilling, and other variables. It pays for itself from savings in development time and in reduced rejections—builds customer good will.

Ask your x-ray dealer to explain all the ways radiography can help you increase yield and cut costs, or ask Kodak for a copy of "Radiography as a Foundry Tool."

EASTMAN KODAK COMPANY
X-ray Division
Rochester 4, N. Y.

Radiography . . .

another important function of photography

Kodak
TRADE-MARK

(*Continued from page* 134)

perheat or tapping temperature is not critical. Casting temperatures, however, were shown to have a profound influence on physical properties and pyrometric control of production casting operations is strongly recommended and desirable.

For design of test bar utilized, optimum properties occurred prior to the macro transformation from columnar and equiaxed crystallization to a completely equiaxed structure and prior to the micro transformation from the regular geometric dendrite pattern to the restricted and random dendrite configuration.

That optimum mechanical properties of tin bronzes are associated with a critical velocity of crystallization was suggested by the authors. Utilization of test bars as a measure of melt quality also was discussed. The authors showed further that density of gun metal bronze increases with decreasing pouring temperature and that pressure tightness and the ultimate in physical properties are not necessarily synonymous with high density values.

Generally, it was stated, a fine equiaxed grain structure precipitated by low pouring temperatures will not yield the ultimate in tensile, elongation and pressure tightness. This is due in a large measure to differences in the mode of solidification between castings poured at high and low temperatures, which the authors attempt to explain, and the resultant differences in the volume of voids created.

The progress report of the Brass and Bronze Research Project was presented by F. M. Baker, University of Michigan, Ann Arbor, Mich., although its preparation was shared by Prof. Clair Upthegrove and Prof. F. B. Rote of the same university. Long-range object of the project is to relate characteristics of the fracture of bronze to other properties of the metal. Work thus far has been confined to 85-5-5-5 brass. This, the second progress report made, was titled "Melt Quality and Fracture Characteristics of 85-5-5-5."

For the past seven months, the research has been directed toward development of a more rapid fracture test, and results to date show promise. A new fracture test chill block has been perfected and Mr. Baker devoted most of his time to its description and application. On behalf of the committee, the speaker invited industry to use the new test block and to report the findings, either as verification or negation of the results attained to date.

Frank Hudson, Mond Nickel Co., London, who was attending the convention, expressed great interest in the report on the Brass and Bronze Research Project, and he pledged that during the coming year at least 20 British nonferrous foundries would try out the new test block and would report their findings to the committee. He further agreed to arrange for a paper to be prepared and made available for the 1951 AFS convention summarizing the British experience with the new fracture bar.

Two papers featured the third and final technical session of the Brass and Bronze Division, at which W. Romanoff, H. Kramer & Co., Chicago, presided, and G. K. Eggleston, Barnes Mfg. Co., Mansfield, O., was co-chairman.

James G. Dick, chief chemist and metallurgist, Canadian Bronze Co. Ltd., Montreal, Quebec, presented the first paper on "Metal Specifications for the Brass and Bronze Foundry." Prior to the last war, the author's company used a system of ingot metal specifications which covered only those alloys cast in comparatively large quantities. These specifications were specific as to individual composition ranges only from the point of view of the principal alloying elements. Insofar as the allowable impurities were concerned for each alloy type, these were either omitted or were covered by a blanket clause such as: "Not more than 1.0 per cent total impurities."

During the war and subsequently the company was called upon to produce castings of all types in a wide range of alloys. This frequently entailed handling alloys with which there had been little previous experience, and it became essential that the ingot purchased be such that no doubt could exist as to alloy composition and quality.

This, Mr. Dick emphasized, required that specifications cover each of the alloys in question, and it was decided to reconstruct the entire metal specifications system. A fairly comprehensive specifications system for ingot metal was prepared, and Mr. Dick's paper outlined the meth-

(*Continued on page* 139)

Meetings of Interest to Foundrymen

June 1-3—Electric Metal Makers Guild, annual meeting, Shawnee Hotel, Springfield, O.

June 6-9—Institute of British Foundrymen, 47th annual conference, Buxton, England

June 22-23—Malleable Founders' Society, annual meeting, The Homestead, Hot Springs, Va.

June 26-30—American Society for Testing Materials, annual meeting and exhibition, Haddon Hall, Atlantic City, N. J.

July 28—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Sept. 25-26—Steel Founders' Society of America, fall meeting, The Homestead, Hot Springs, Va.

Sept. 28-30—All Canadian Foundry Conference, Royal Connaught, Hamilton, Ont.

Oct. 12-14—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

Oct. 13-14—Gray Iron Founders' Society, annual meeting, Netherland Plaza Hotel, Cincinnati

Oct. 13-15—Non-Ferrous Founders' Society, annual meeting, Hotel Statler, Boston

Oct. 19-20—Texas Regional Foundry Conference, Plaza Hotel, San Antonio, Tex.

Oct. 23-27—National Metal Congress and Exposition sponsored by American Society for Metals, American Welding Society, Metals Branch—American Institute of Mining and Metallurgical Engineers, and Society for Non-Destructive Testing, International Amphitheatre, Chicago.

Nov. 2-3—Metals Casting Conference, sponsored by Purdue University with Central Indiana and Michiana Chapters of AFS, Purdue University, West Lafayette, Ind.

Nov. 9-10 — National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago

Nov. 9-11—Steel Founders' Society of America, annual technical and operating conference, Carter Hotel Cleveland

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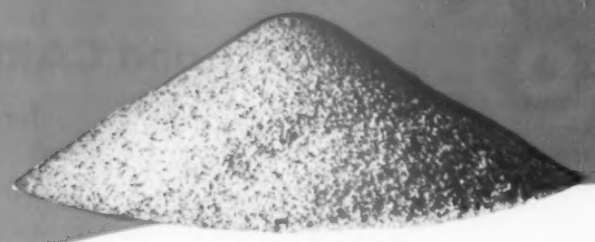
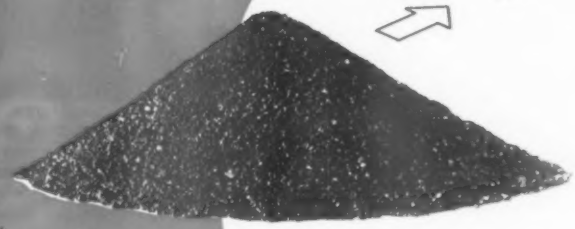
Engineered to fit the job—and budget

LOW TEMPERATURE DRYING
OR
HIGH TEMPERATURE BURNING





High temperature burning

Nichols Sand Reclamation Systems will meet the requirements of most foundries—

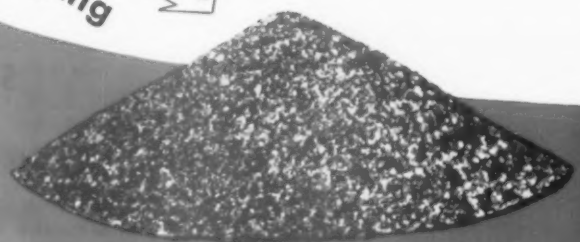
Wet scrubbing with either low temperature drying or high temperature burning.

Which system to use is largely determined by type of castings and core practices. Each system possesses definite advantages under specific conditions.

Investigate—today—sand reclamation with the Nichols Systems. A subject with great possibilities—substantial savings.

The photos shown are unretouched.

Low temperature drying



Nichols offers to interested foundries the services of a pilot plant for small scale processing and a well staffed engineering department for preliminary analysis or complete plans.

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Your inquiries are invited.

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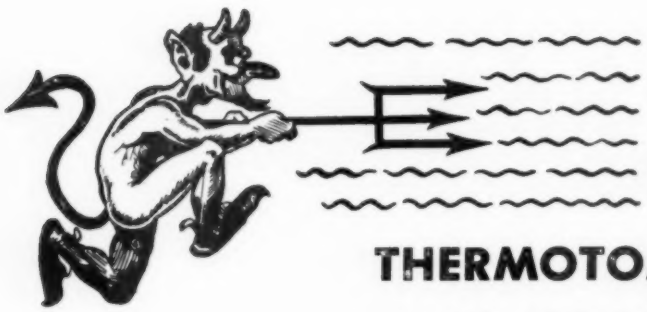


Soffel's

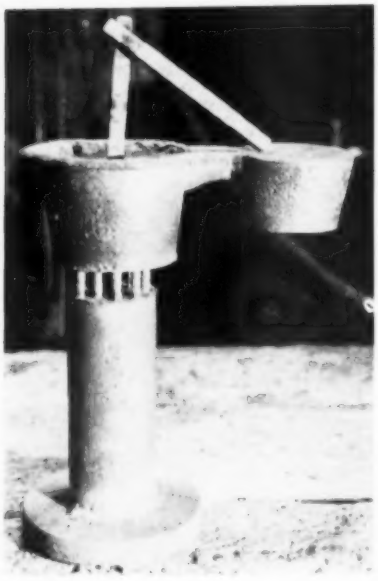
THERMOTOMIC COMPOUNDS
(Patented)
and CARBON FREE LIQUIDIZERS

Keeps metal molten!

. . . for Steel, Iron, Aluminum, Brass, Bronze, Copper

300 lb. aluminum bronze bearing cap cast with THERMOTOMIC feeding ring core under riser. Note small feeder opening which facilitates removal of riser from casting, resulting in greatly reduced cleaning costs.

THERMOTOMIC is a patented Exothermic compound that can be molded into any desired shapes and used as feeding inserts under risers or as facing application where it is desired to maintain fluidity of the casting metal. THERMOTOMIC permits reversal of the trend towards large feeding heads and risers, making it possible to use heads that are shorter and more compact with very small feeder openings. This permits easy removal of heads and gates and sharp reductions in cleaning and finishing costs. When THERMOTOMIC is used as inserts or as facing in the mold, heat at thin metal sections is retained until the main body of the casting has solidified, thus eliminating shrink cracks and improving grain structure and tensile strength.



Monel Casting
270 lbs. solid

Made by direct pouring through the Thermotomic strainer core under the feeding head.

No chills were used, no shrinkage at the flange. Note depth of shrinkage in the feeding head.

Soffel's Carbon Free Liquidizer produces greater yield

Steel Riser above left contains twice as much sound metal—These risers, made in the same mold, illustrate how Soffel's Carbon Free Liquidizer produces sounder castings and saves metal. The riser on the left, on which Carbon Free Liquidizer was used, contains more than twice as much sound metal as the riser on the right on which a common carbonaceous pipe eliminator was used. It is readily seen from this that the use of Soffel's Carbon Free Liquidizer permits substantial reductions in size of risers.

BEWARE OF IMITATIONS: We are the originators of Carbon Free Liquidizer.

PITTSBURGH METALS PURIFYING COMPANY

Manufacturers of Quality "Fluxes for all Metals and Alloys"

1352 Marvista Street **Pittsburgh 12, Pa.**

(*Continued from page* 136)

ods and ideas involved in its preparation.

Mr. Dick asserted that the value to the foundry of a proper metals specification system can hardly be over-emphasized. He pointed out that since time of issue of the reconstructed specifications system, no heat of ingot finally accepted by the organization has ever been found to give trouble in actual castings production. Currently, the company is reconstructing its system covering binary alloys and it is expected that this will produce similar results.

Conditions Here Different

George P. Halliwell, H. Kramer & Co., Chicago, contributed a written discussion to Mr. Dick's paper in which he pointed out that the specifications outlined by the latter had been set up to meet the conditions pertaining in Canada, not the United States. He expressed doubt if the practice can be followed by the smaller foundries.

Second paper at this session dealt with "Aluminum Additions in Commercial Yellow Brass." It was prepared by R. A. Colton and R. H. Gilbert, American Smelting & Refining Co., Barber, N. J., and presented by the former. The introduction stated that it has long been the custom in many foundries making yellow brass castings to add small amounts of aluminum to the metal prior to pouring. Usual reasons for such additions are that the aluminum is necessary to improve fluidity or castability of the metal, and also to improve surface finish of sand castings.

While advocates of adding aluminum to yellow brass are numerous, a large number of shops consider this practice highly detrimental. The speaker stated that practically no experimental evidence is available for evaluating the effects of aluminum in yellow brass; therefore, purpose of the current investigation was to determine the exact effects.

Mr. Colton reported that aluminum contents up to 0.5 per cent have practically no effect on tensile and yield strengths of commercial yellow brass, while elongation is reduced continuously as aluminum content increases. With aluminum content in excess of 0.5 per cent, tensile and yield strengths increase rapidly, accompanied by a more marked decline in elongation. It was observed that presence of aluminum reduces considerably the amount of smoke or flare normally experienced in casting yellow brass. It also increases castability to the extent that the metal can be poured at a lower temperature than when no aluminum is added.

Aluminum additions up to 0.2 per cent give incomplete thin oxide films which conceivably could be trapped in the metal and cause some trouble. Additions in excess of 0.2 per cent apparently give heavier oxide films of a silvery color, which again could be more easily trapped. The authors reported it was not possible to evaluate effect of aluminum on finishing yellow brass castings. However, they said it is possible that aluminum additions can produce oxide films which may remain entrapped in the metal and interfere with machining and polishing.

The Brass and Bronze Division roundtable luncheon, May 9, attracted an attendance of about 175 and provided an outstanding program. George P. Halliwell, chairman of the division, called the meeting to order and invited co-operation in the division's general and research undertakings. He then introduced B. A. Miller, Baldwin Locomotive Works, Philadelphia, as presiding officer of the roundtable, and H. L. Smith, Federated Metals Division, American Smelting & Refining Co., Pittsburgh, as co-chairman.

Discussion topic was "Casting Defects," and discussion leader was Prof. Howard F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass. Using human and technical knowledge in a judicious mixture, Prof. Taylor made a most interesting presentation of his subject.

A special feature of the roundtable luncheon was a capable description of the "C" or Croning process for making molds for nonferrous and ferrous castings. This description was given by B. N. Ames, Material Laboratory, New York Naval Shipyard. The process, described in broad detail in THE FOUNDRY, October, 1948, p. 130, makes use of a plastic binder in the molding sand. During the past two years, the process has been investigated in the United States as to its practicability and economy. It was the opinion of Mr. Ames that the process is economical and practical for smaller repetitive castings.

PATTERNMAKING MATERIALS

Provide Meeting Topics

TECHNICAL meeting sponsored by the Pattern Division was directed by James Mathias, Accurate Matchplate Co., Chicago, with A. F. Pfeiffer, Allis-Chalmers Mfg. Co., Milwaukee, as co-chairman.

First speaker was K. A. Miericke, Baroid Sales Division, National Lead Co., Chicago, whose paper was entitled "Making Pressure Cast Aluminum Matchplates in Plaster Molds." Mr. Miericke first reviewed briefly the procedure followed in making matchplates and then pointed out the following essentials.

Mold material is combination of 75 to 80 per cent gypsum plaster and 20 to 25 per cent fibrous talc measured by weight. To this is added 100 to 180 parts of water which should be mixed 4 to 5 minutes or until the mixture seems to start to thicken. The more water used, the weaker is the resulting composition. He also urged that once a satisfactory mixture has been found, stay with those proportions. He pointed out that shrinkage varies as the composition is changed and mismatches result. As plaster sets, a definite expansion takes place. This can be partially controlled by chemicals or by use of hot water in preparing the slurry. Mr. Miericke recommended hot water.

In burning out the mold, it it necessary to remove not only the excess water, but also that formed by chemical reaction of the ingredients. Ideal temperature for drying is 350 to 450° F. Type of alloy selected for the plate should be one having a long solidification range. Mr. Miericke suggested an alloy having fairly high amounts of copper and silicon with iron kept to a minimum. Recommended pouring temperature is 1080 to 1150°. Metal at this temperature is not too fluid, but the pressure used pushes the metal into the mold cavity.

Second paper was presented by R. F. Dalton, development engineer with U. S. Gypsum Co., Chicago, entitled "Production Patterns and the Matchplate." He reviewed development of the matchplate from solid and split loose patterns through gated patterns, use of vibrator frame and drop machine. He surmised that perhaps the matchplate was developed by a foundryman who, in looking over his scrap casting pile, found one with a heavy fin at the parting line which extended to the outer portion of the flask. Manufacture of iron matchplates was described in trade literature as early as 1907.

Mr. Dalton stressed the need for accurate cost data on casting production to determine if development

(*Continued on page* 141)

HERE'S HOW...

CHICAGO TRANSIT AUTHORITY CUTS MELTING TIME IN HALF

. . . cuts fuel cost 50% . . . cuts metal losses 40%

Chicago Transit Authority, one of the world's largest transportation systems, operating 2,400 streetcars, 1,625 elevated cars, and 1,100 buses, installed a Fisher oil fired Simplex Melting Furnace for remelting, reclaiming scrap, brass, and bronze. Journal and axle bearing brasses and worn parts from all types of rolling stock are melted down and recast into new parts.

The new Fisher Simplex replaces a conventional oil fired spherical type open flame furnace. Check this "Before and After" story of faster melting, lower fuel cost, and lower metal losses.

	BEFORE	AFTER
Heating time 1000 lb. charge	2½ hrs.	1 hr.
Fuel cost per pound melted	$.0056	$.0027
Metal Loss	5%	3%

Ask for bulletin #28-A "Fisher Simplex Furnaces."

FISHER ADVANTAGES

Furnace charges *easily* from front at convenient height. . . . More scrap can be charged because of large area above molten metal line. . . . Uses open flame reverberatory melting, the *fastest* fuel fired melting method. . . . Two section furnace shell removable for *easy* relining.

Fisher Furnaces

A DIVISION OF LINDBERG ENGINEERING CO.
2453 West Hubbard Street, Chicago 12, Illinois

(*Continued from page* 139)

of matchplates for specific jobs is profitable. In closing, the speaker pointed to the advancement of plaster casting techniques and materials and suggested their use for other types of nonferrous casting production.

A paper, "Cold Formed Flexible Precision Patterns and Coreboxes," prepared by J. E. Wiss and R. B. Wagner, Perma-Flex Mold Co., Columbus, O., was presented by Mr. Wiss. This discussion served to introduce a new pattern shop material, a synthetic rubber which is worked cold as a liquid and which vulcanizes to a solid state at room temperature. In addition to reading the paper, a step-by-step description of one method of making flexible cope and drag multiple patterns with this new material, Mr. Wiss also demonstrated its use by preparing a small amount of the material, pouring it into a mold and exhibiting the final product at the conclusion of his talk.

In the forming of investment plaster surfaces, Mr. Wiss enumerated these advantages for the flexible material: Parting compounds can be completely eliminated; investment plaster can take its complete setting expansion without distortion; minor undercuts and backdrafts can be extracted readily without damage to the plaster surface; pattern plate equipment of the corebox type with pattern face and flasking side walls can be made in one piece, thereby eliminating danger of leakage and cleaning up the operating of mold forming; with proper selection of flexible material, thousands of accurate plaster impressions can be made; with plaster of the high permeability type, smooth unbroken casting surfaces can be developed and handled readily from the pattern.

At the Pattern Division roundtable luncheon G. E. Garvey, City Pattern & Foundry Co., South Bend, Ind., presided. H. C. Swanson, Arrow Pattern & Foundry Co., Chicago, was cochairman. A paper prepared by S. Zuckor, S. Greenfield Co., Buffalo, entitled "An Alloy Designed for Pattern Shops" was presented by Leonard Greenfield, S. Greenfield Co., in the absence of Mr. Zuckor.

The paper describes an all-purpose pattern shop alloy designed for use in a majority of pattern castings made in most shops. It contains copper, silicon, aluminum and magnesium in addition to grain refiners such as titanium, zirconium, boron and beryllium. Properties claimed for it are: Good fluidity, corrosion resistance, less hot-shortness than aluminum-copper alloys and localized shrinkage, ability to be melted and handled at low temperatures, and good machinability. Good appearance, good thermal stability, high yield point, high tensile strength, high bearing strength, and good ductility also are claimed.

The alloy was designed to be melted and poured under the same conditions as any other alloy. The speaker outlined good melting and fluxing procedures.

In a discussion of molding sand properties, the speaker recommended these conditions: Permeability approximately 31, moisture content 5.5 per cent, compressive strength 3.8 psi, and temperature 72° F.

Vincent Sedlon, Master Pattern Co., Cleveland, read a paper by Arthur J. Tuscany, Foundry Equipment Manufacturers Association, Cleveland, entitled "The Pattern Shop and Our National Economy." This paper was published in THE FOUNDRY, January, 1947. Mr. Sedlon then asked if any of the patternmakers present would be interested in contributing toward a national association for furthering the interests of the patternmaking industry. Response was almost unanimous approval.

MALLEABLE IRON DISCUSSION

Covers Variety of Subjects

MALLEABLE iron foundrymen discussed a wide range of technical and practical phases in three sessions, a roundtable luncheon and in two joint sessions with the gray iron group which dealt with nodular iron.

Opening session Monday morning had H. C. Stone, Belle City Malleable Iron Co., Racine, Wis., and E. Roby, Jr., Peoria Malleable Castings Co., Peoria, Ill., presiding. Richard W. Heine, University of Wisconsin, Madison, Wis., discussed "Some Effects of Deoxidizing Additions on Malleable Iron" in which he described a sprue test to measure the effect of the oxidation phase of melting. Amount of oxidation was determined by the quantity of aluminum required to produce mottling in the sprue. Data obtained by the author indicated that small additions of aluminum or titanium sufficient to deoxidize the iron, resulted in improved physical properties, while additions which were insufficient or in excess caused lowered physical properties.

In the discussion Milton Tilley, National Malleable & Steel Castings Co., Cleveland, pointed out that the author's work was of considerable interest particularly in duplexing operations where highly oxidizing conditions sometimes occur in the cupola. However, he employed ferrosilicon as the deoxidizing reagent rather than aluminum to correct the condition. J. E. Rehder, Bureau of Mines, Ottawa, Canada, stated that no proof of deoxidation was indicated in the paper since no oxygen determinations were made, and that he doubted oxygen would be present due to the considerable quantities of carbon and silicon which in themselves were deoxidizers. In response, Mr. Heine pointed out that silicon was not effective as a deoxidizer at 2800° F, and the question of oxygen depended not so much on the actual amount present, but rather the form in which it existed.

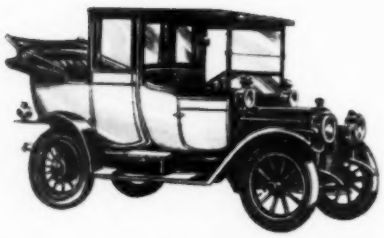
Second paper at the session, "Subcritical Isothermal Graphitization" by Harry A. Schwartz, J. B. Hedberg and R. Eriksen, National Malleable & Steel Castings Co., Cleveland, was presented by Dr. Schwartz. The paper discussed an investigation which indicated that the annealing process consists of three stages rather than two, and includes an intermediate stage in the cooling interval where graphitization is extremely rapid during a short-time interval. Hence, the rate of secondary graphitization cannot be defined without first defining the conditions of the intermediate stage.

Second malleable iron session was under the direction of F. W. Jacobs, Lake City Malleable Iron Co., Ashtabula, O., and R. P. Schauss, Illinois Clay Products Co., Chicago. W. D. McMillan, International Harvester Co., Chicago, presented a paper on "Furnace Atmosphere for Malleable Annealing" which discussed composition and chemical reactions of several types of atmospheres applied in malleable annealing furnaces as well as the causes of ferritic and pearlitic rims, the compositions effective in retarding decarburization and the practice and precaution necessary with inflammable atmospheres.

In the discussion R. M. Cherry, General Electric Co., Schenectady, N. Y., pointed out the necessity of having a gas-tight furnace to prevent the ingress of air which would cause difficulties in satisfactory annealing. Eric Welander, Union Malleable Iron Co., Moline, Ill., stated that over 10 per cent hydrogen in the furnace at-

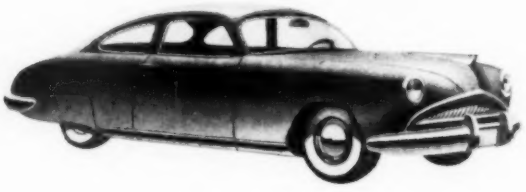
(*Continued on page* 144)

1912



60 BRAKE HORSEPOWER . . . 9 MILES PER GALLON!

1950



130 BRAKE HORSEPOWER . . . 18 MILES PER GALLON!

MORE HORSEPOWER— LOWER OPERATING COSTS!

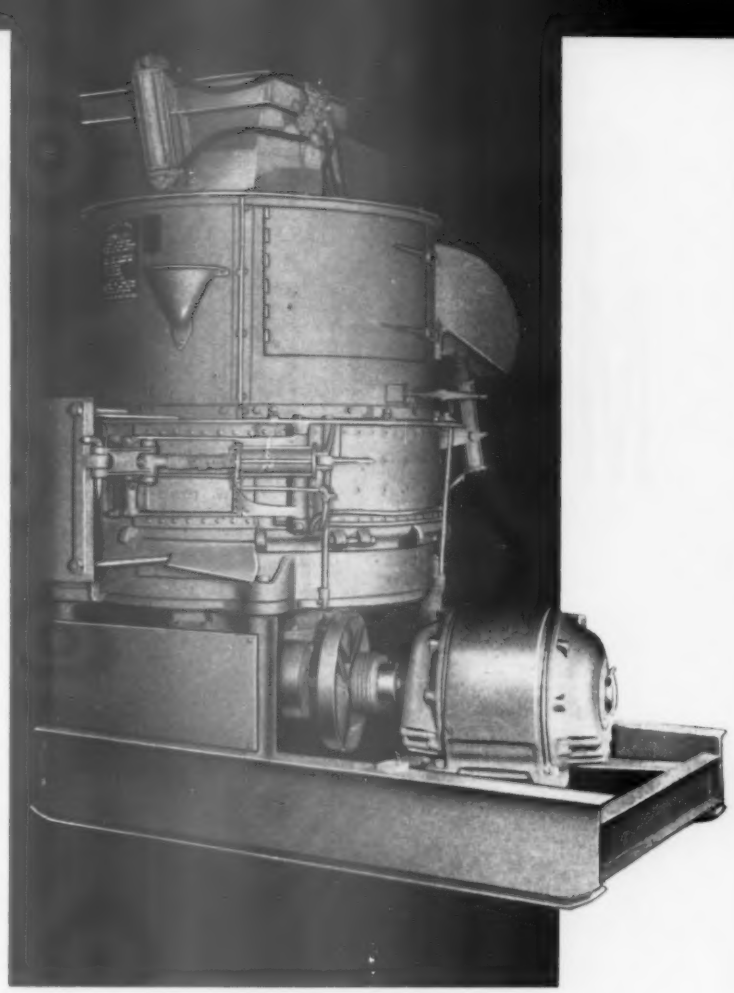
The horsepower of the automobile has been doubled and its speed greatly increased. At the same time, gasoline consumption per mile has been greatly reduced and service life lengthened. This same trend, towards increased power and speed with resultant economies, is apparent in the aircraft, the railroad locomotive, the machine tool and all other progressive industries.

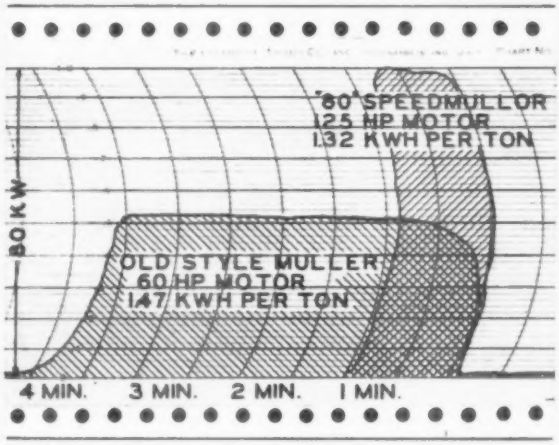
The Speedmullor is a result of the same type of progressive engineering development applied to the foundry machinery industry. The Speedmullor embodies a new principle of mulling and is capable of utilizing higher speed and power and producing foundry sands mulled to their *maximum attainable* physical properties with the lowest material cost, the lowest power cost and the lowest operating and maintenance cost per ton.

SPEEDMULLOR

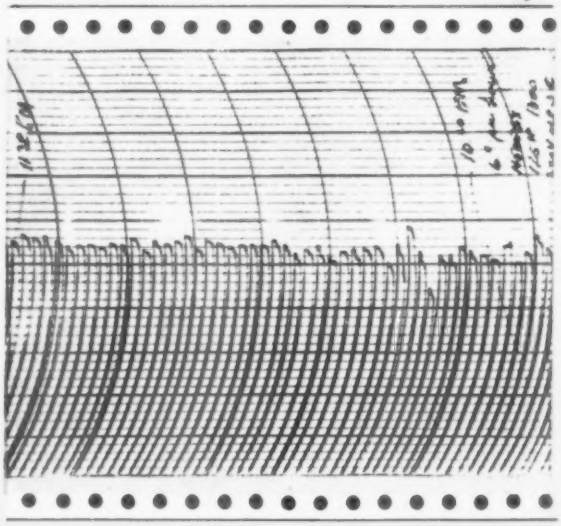
THE MODERN, HIGH POWER, LOW COST METHOD OF MULLING

Like other modern machines, the high powered Speedmullor accomplishes a far better job in less time . . . and at lower cost. With lightweight moving parts, the Speedmullor utilizes centrifugal force to mull sand faster and more thoroughly than any old style muller. The rubber tired mulling wheels of the Speedmullor transmit twice the mulling pressure and cover three times as much mulling area as the heavy, slow-rolling vertical wheels of the latest design of old style muller.





A typical watt-hour meter record of operation of a manually controlled Model "80" Speedmullor during a period of operation of exactly one hour. Fifty batches were uniformly and thoroughly mulled . . . over 1150 cu. ft. of sand mulled to ultimate physical properties in one hour. The Speedmullor's high capacity and its thoroughness of mulling assure the lowest overall cost per ton of sand completely mulled.



Typical are the results of recent tests run on a Speedmullor and an old style muller of the latest design, both preparing the *same* sand in the *same* sand system. The Speedmullor, utilizing higher horsepower for a far shorter period of time, consumed 1.32 K.W.H. per ton of sand mulled to maximum physical properties. The old style muller, utilizing lower horsepower for a far longer period of time, consumed 1.47 K.W.H. per ton of sand mulled to approximately equal properties.

A NEW 36 PAGE BULLETIN CONTAINING THE LATEST INFORMATION ON MULLING

Facts, figures, illustrations and installation photographs . . . the new 36 page Speedmullor bulletin is chock full of the latest data. It presents the story of mulling as well as the story of the Speedmullor's development and authoritative engineering information on all Speedmullor models and on the popular B&P Combination Sand Conditioning and Mulling Units. Send for your free copy today!

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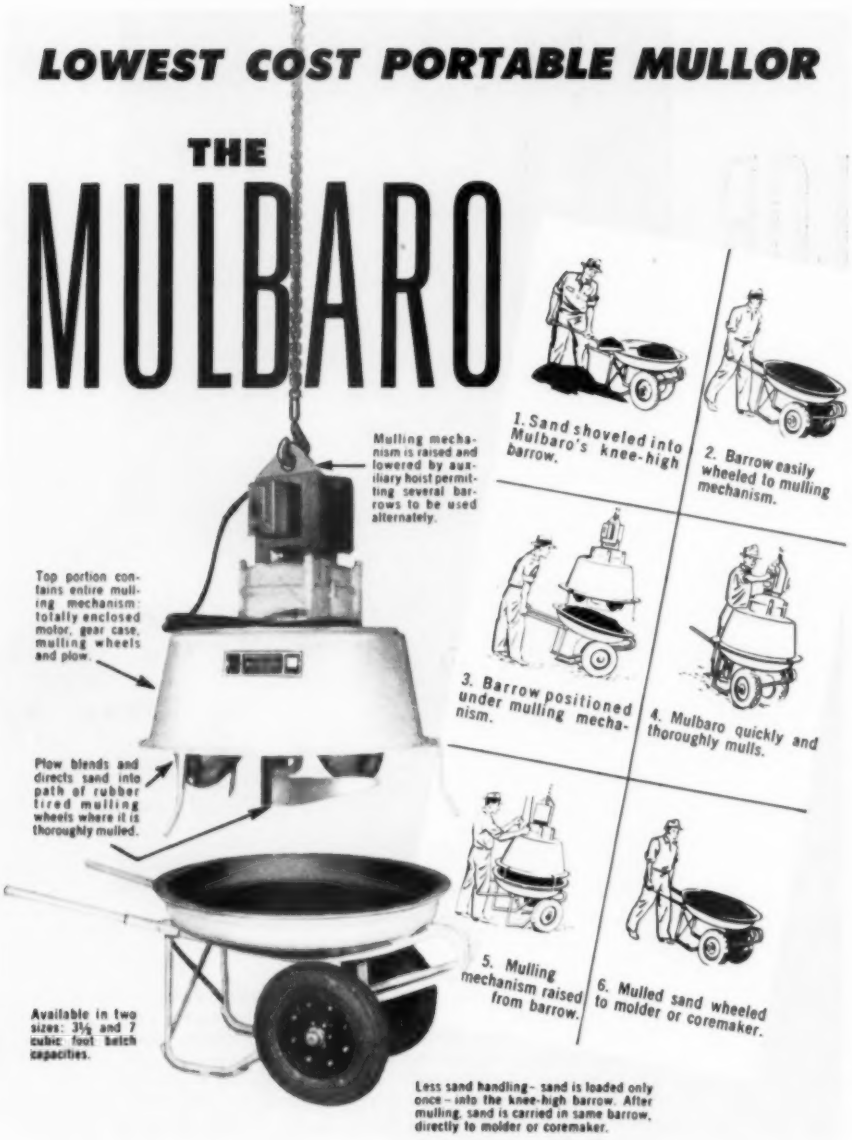
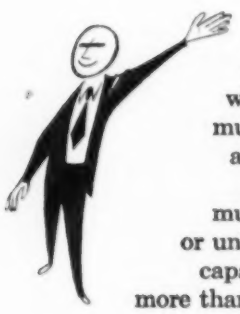
Manufacturers of the Speedmullor • B&P Combination Sand Conditioning and Mulling Unit • Mulbaro • Sandslinger • Speedslinger • Hydra-Slinger • Nite-Gang • Junior Nite-Gang • Preparator • Screenarator • B&P Plate Feeder • B&P Turntable • B&P Gyratory Screen

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION, INC. MEMBER FEMA

LOWEST COST PORTABLE MULLOR

THE MULBARO


Mulling mechanism is raised and lowered by auxiliary hoist permitting several barrows to be used alternately.
Top portion contains entire mulling mechanism: totally enclosed motor, gear case, mulling wheels and plow.
Plow blends and directs sand into path of rubber tired mulling wheels where it is thoroughly mulled.
Available in two sizes: 3½ and 7 cubic foot batch capacities.
1. Sand shoveled into Mulbaro's knee-high barrow.
2. Barrow easily wheeled to mulling mechanism.
3. Barrow positioned under mulling mechanism.
4. Mulbaro quickly and thoroughly mulls.
5. Mulling mechanism raised from barrow.
6. Mulled sand wheeled to molder or coremaker.
Less sand handling – sand is loaded only once – into the knee-high barrow. After mulling, sand is carried in same barrow, directly to molder or coremaker.



The *really* portable Mulbaro is easily moved about the foundry or core room and the sand is mulled in the same barrow in which it is brought to and taken from the mullor. The sand is handled only once! With an additional barrow or barrows, the Mulbaro mulls almost continuously. While the sand is being mulled in one barrow another is being loaded or unloaded. Thus the Mulbaro offers the capacity of two or more mullors for slightly more than the price of one . . .

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☐ Send details on free trial use of the Mulbaro

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(*Continued from page* 141)

mosphere causes trouble, and the carbon monoxide-carbon dioxide relationship also is important and should range in ratio from 1:1 to 2:1. In response Mr. McMillan stated the trouble with a hydrogen atmosphere usually is due to water vapor rather than the hydrogen. He also stated that when carbon monoxide is high, difficulty is encountered in first stage graphitization due to poor equilibrium. He also said he believed that use of low combustibility gases in the furnace atmosphere eliminated any possibility of explosion.

Second paper, on "Surface Hardening of Pearlitic Malleable Iron" by S. H. Bush, W. P. Wood, and F. B. Rote, University of Michigan, Ann Arbor, Mich., was presented by Mr. Bush. It described a study of nine pearlitic malleable irons of different chemical compositions and production practice for response to surface hardening, heat treatments by flame and induction methods. On the basis of hardness of 50 Rockwell C at a minimum depth of 0.060-in., eight of the irons could be satisfactorily induction hardened with 9600 cycle and seven with 3000 cycle frequency. At high frequencies two of the irons were consistently unsatisfactory. Iron flame hardened at an indicated temperature of 1500° F was generally satisfactory with one exception when quenched with water. With an oil quench the hardness of the cases was below the specified value of 50 Rockwell C at 0.060-in. Comparisons of the response of the irons to various surface hardening treatments were presented graphically, and the irons also were compared on the basis of chemical composition.

Design Straightening Dies

Roundtable luncheon of the malleable iron group was held Tuesday noon with James H. Lansing, Malleable Founders' Society, Cleveland, and Carl F. Lauenstein, Link-Belt Co., Indianapolis, as chairmen. Subjects discussed included effect of excessive oxidation in duplexing and design of straightening dies.

Milton Tilley, National Malleable & Steel Castings Co., Cleveland, said he found that when silicon loss in the cupola exceeded 25 per cent, trouble was encountered in annealing. However, additions of ferrosilicon in the air furnace eliminated the trouble. George Stone, Belle City Malleable Iron Co., Racine, Wis., mentioned that when considerable additions of ferrosilicon had to be made, unfavorable inclusions were found in malleable iron as well as in gray iron. That was attributed to the aluminum in the ferrosilicon. Use of silvery pig

iron eliminated the trouble. He also stated that attention should be paid to color of the slag in cupola melting. Black slags usually give iron of poor characteristics while those of a green color produce good iron.

Design of straightening dies was discussed by K. L. Sanders, Albion Malleable Iron Co., Albion, Mich., and H. G. Sieggreen, Central Foundry Division, General Motors Corp., Saginaw, Mich. Both speakers used numerous slides to illustrate their remarks which included descriptions of how the dies function.

Third malleable iron session, under the joint chairmanship of H. Hunt, Auto Specialties Mfg. Co., St. Joseph, Mich., and F. Wurscher, Marion Malleable Iron Co., Marion, Ind., featured two papers. The first, "Inspection of Pearlitic Malleable Castings," was presented by D. T. Martin, Saginaw Malleable Iron Plant, Central Foundry Division, General Motors Corp., Saginaw, Mich. The second, "Quantitative Correlation of Factors Influencing Annealing," was prepared and presented by Richard Schneidewind, University of Michigan, Ann Arbor, Mich.

Discuss Inspection Methods

Following a general reference to pearlitic castings and the part they play in a competitive field, and to the organizational structure and duties of an inspection department, Mr. Martin with the aid of slides discussed a series of typical defects and the methods and equipment developed to cope with the problem. Since the foundry department is the first operating point where the common causes of scrap are the greatest, it is one of the key areas in which to place members of the inspection department. A properly trained inspector readily recognizes scrap caused by any improper step in the cycle of operation involved in the casting production. Sequence of examination depends upon design, dimensional tolerances, methods of machining and the final application of the finished part.

The greater part of the paper was devoted to details under: White iron inspection, grind inspection, finished iron inspection, visual inspection, induced magnetic testing for surface defects, hardness testing, salvage and returned goods inspection.

In the second paper Professor Schneidewind with the aid of several charts, showed how the many variable factors—melting practice, annealing practice, pouring methods, shakeout and cooling periods—affect the final result. Conclusions based on former trials are helpful, but not necessarily infallible in all cases.

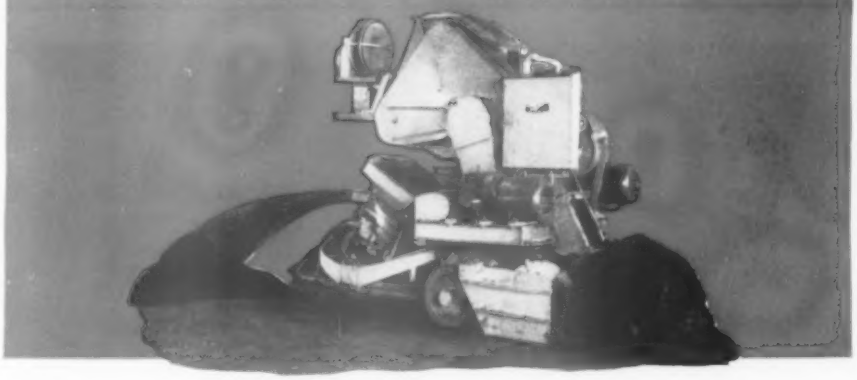
New the NITE-GANG

for complete sand conditioning

only the NITE-GANG offers these

10 IMPORTANT FEATURES

- Self Propels!
- Self Loads—Without Prior Windrowing!
- Blends!
- Magnetically Separates!
- Breaks Lumps and Screens!
- Double Aerates!
- Windrows or Piles!
- Travels and Loads at Variable Speed!
- Leaves a Clean Level Floor!
- Extremely Maneuverable!



As the Nite-Gang moves into the unprepared sand heap the rotating spiral completely blends and conveys all of the sand in its path to the bucket elevator. The buckets elevate and direct the sand onto the magnetic separator which removes all of the iron scrap and shot before the sand is discharged into the M5 Screenarator Unit. The Screenarator, mounted on a swivel base, screens, double aerates and windrows or piles the completely conditioned sand anywhere within an arc of 240 degrees and within a radius of forty feet.

Write for new Nite-Gang Catalog!

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Industry BRIEFS

DEROIT Gray Iron Foundry, 282 Iron St., Detroit, has organized the Lansing Foundry Co., to operate the gray iron foundry recently acquired from Novo Engine Co., 702 Porter St., Lansing, Mich. Ralph Hippler has been named superintendent. Officers of Detroit Gray Iron Foundry, who will hold similar positions with the new foundry, include: M. L. Gardner, president; B. P. Costello, secretary, and J. S. Sherer Jr., a member of the board of directors.

* * *

Buckeye Products Co., 7020-34 Vine St., Cincinnati, has completed construction of a new building to provide additional space for manufacturing and warehouse facilities. New equipment has been installed in the plant. Company manufactures foundry facings and supplies including nonsilica partings, furnace cement and core oils.

* * *

Meehanite Metal Corp., Pershing Square Bldg., New Rochelle, N. Y., has licensed the following foreign companies to produce Meehanite castings: Alley & McLellan, Glasgow, Scotland; Limhamns Aduceringsverk, Malmo, Sweden; Franco Tosi S.p.A., Legnano, Italy; Goulds Mechanization Ltd., Newport, Monmouth, Wales; Jeffress Foundries Pty. Ltd., Northgate, Queensland; David Duncan, South Melbourne, Victoria, Australia; and Soc. Miniere et Metallurgique du Perigord, Fumel (Lot-et-Garonne), France.

* * *

Hansell-Elcock Co., Chicago, has completed a new pattern storage building for its foundry division. Replacing facilities destroyed last year by fire, the new building, of brick and steel construction, contains 20,000 sq ft of floor space. It is equipped with overhead cranes and is provided temperature control by unit heaters. This project is part of a $300,000 plant improvement and mechanization program which includes installation of a sand system, sandslinger and additional molding machines.

* * *

Automatic Transportation Co., 149 West 87th St., Chicago, has appointed the Lyall N. Crissman Co., 314 Boulevard of the Allies, Pittsburgh, as representative there for its line of electric industrial trucks. The Crissman company was formerly located at 2006 First National Bank Bldg., Pittsburgh.

* * *

Metalloy Corp., 527 Marquette Ave., Minneapolis, division of Lithium Corp. of America, Minneapolis, has completed reconstruction and expansion of its plant there. Partial damage caused by fire necessitated additional plant space and modern machinery with faster output.

* * *

Erie Malleable Iron Co., Erie, Pa., producer of malleable iron and pearlitic iron castings, has appointed Allmon Products Division, Allmon Steel Co., Arrott Bldg., Pittsburgh, as exclusive representative in the Pittsburgh area.

* * *

St. John X-Ray Laboratory, Califon, N. J., has been authorized by the Atomic Energy Commission Isotopes Division, Oak Ridge, Tenn., to handle Cobalt 60 on a rental basis. Other radioactive materials also are available.

* * *

Exothermic Research Products Inc., Buffalo, has been incorporated in New York, with capital stock listed at 200 shares, no par value. Directors are: Earl R. Pierce, Alexander H. Colwell Jr., and Nelson W. Chapman, all of Buffalo.

* * *

American Steel Foundries, Chicago, has erected a 9500-sq-ft addition to the east end of its main foundry building in Granite City, Ill., to be used to produce steel railroad castings. C. H. Walcher is works manager.

* * *

F & W Pattern Works Inc., West Allis, has been incorporated in Wisconsin, with capital stock listed at 300 shares, no par value. Directors are Fay D. Walrath, Edward A. Koch, and Lester W. Kroes.

* * *

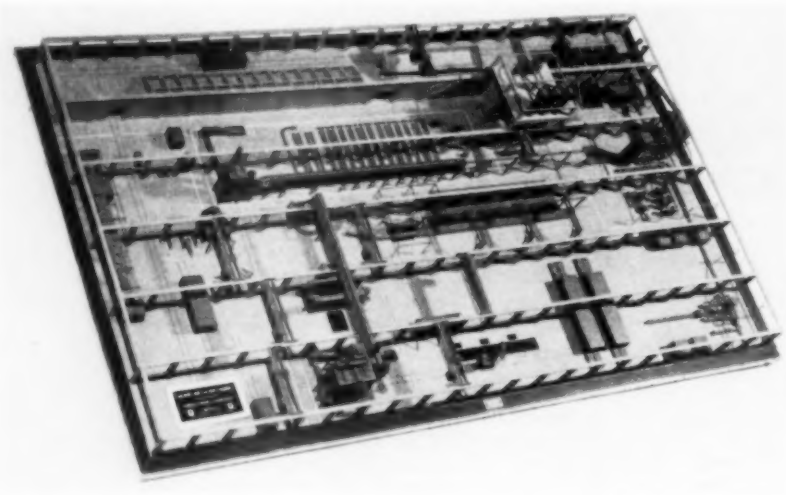
American Brass Novelty Co., Water St., Grand Haven, Mich., has changed its name to Michigan Brass Co. Robert Lilybald is president of the company which now manufactures plumbing supplies.

* * *

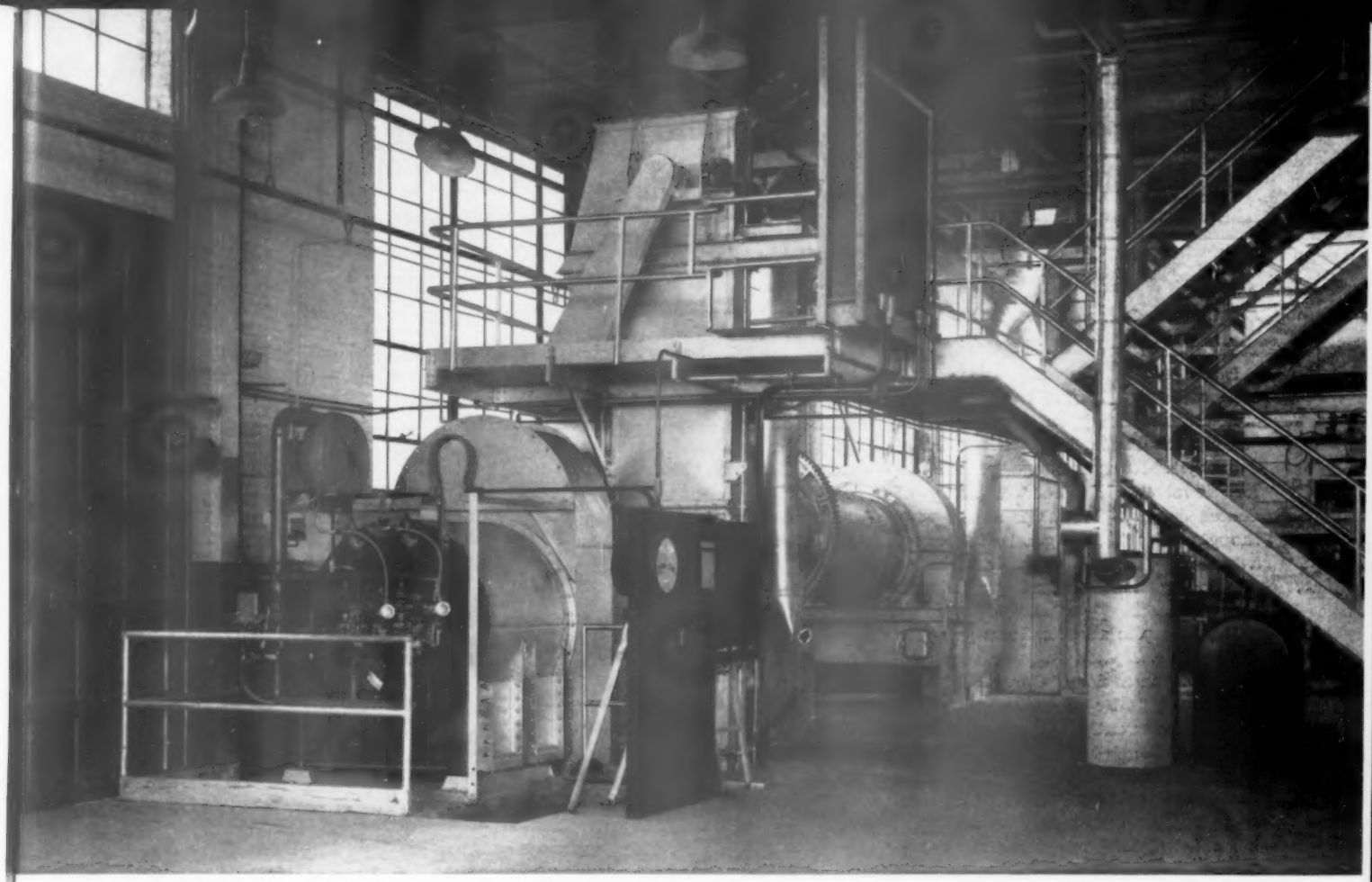
Nonferrous Founders' Society, formerly located at 127 North Dearborn St., Chicago 2, has moved to Room 507, 192 North Clark St., Chicago 1. James W. Wolfe is executive secretary.

* * *

Messrs. Vokes (Canada) Ltd., Hermant Bldg., 21 Dundas Square, Toronto, have been appointed sales distributors in Canada for F. & M. Supplies Ltd., 4 Broad Street Place, London E.C. 2, England.



SCALE MODEL of a new machine tool castings foundry designed by Lester B. Knight & Associates, Chicago, for construction in Europe. The plant will cover about 270,000 sq ft and will provide for production up to 60 tons per 8-hr shift with approximately 50 man-hours per ton. Castings will vary in weight from a few ounces to about 15 tons



Apron Conveyors Are Unsurpassed for Handling Hot Sand and Castings from the Shakeout—Also Cut Time and Cost of Conveying Castings Through Cleaning Departments. Types, Sizes and Pitches for any Layout.

Compact System for Malleable Annealing, Showing Shakeout, Dust-Sucker Hood, Sorting Table Conveyor, Material Handling and Cleaning Equipment, Storage Bins, and Lowerator That Permits Each Pot in the Stack to be Packed at a Convenient Height.

Sand Control

cuts core costs

● Drying your own core sand results in better deliveries and lower sand costs. It permits exact duplication of every mix — saves on binders — results in a uniform bake — constant core structure and reduces losses of both cores and castings.

Dryers or combination dryer-coolers — gas, oil or steam heated — floor or overhead mounting — complete with storage, feeding and all conveying facilities — large or small capacities to meet your requirement. The C. O. Bartlett & Snow Company, 6201 Harvard Avenue, Cleveland 5, Ohio.

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FABRICATORS ERECTORS

Readers' COMMENT

Approves of Sand Articles

TO THE EDITOR:

I am not in the habit of writing congratulatory letters to authors of articles that I happen to like. I have "two" reasons for this: First, being lazy by nature, I begrudge the effort involved; and second, being of Scotch descent, I shudder at the very thought of wasting good stationery, a stamp, and the valuable time of our lovely and talented girl at the typewriter.

But—despite all this, I am going to make an exception in your case, because of the article, "Core and Molding Sands," by John Howe Hall, which is currently appearing in THE FOUNDRY.

Mr. Hall has done a splendid job—a much better job than he is likely to receive credit for! In my humble opinion, he has cleared that middle path between the laboratory and the foundry, giving each of these departments some genuine food for thought, and perhaps a little more respect for each other.

He has also shown the iron foundryman that the latter would do well to peek occasionally into the notebook of the steel man.

HAROLD E. HENDERSON
"Sand Man"

811 *Carlton St.*
H. C. Macaulay Foundry Co.
Berkeley 10, *Calif.*

* * *

Miracle of The Bells

TO THE EDITORS:

A comparatively recent issue of a New York newspaper presented a columnist's typical description of why, when, where and how an order for 51 bronze replicas of the well known Liberty Bell was placed in France. The alleged reason—American firms would not accept the order. One prominent firm declined on the ground that it could not meet the delivery date. The bells were for display in an anticipated Independence Savings Bond drive. After filling their part in this program, one was to be given the District of Columbia, one to each of the 48 states in the union, and one each to Hawaii and Alaska, now hovering on the admission threshold.

Total cost, which presumably included production and shipping, the writer announces, amounts to $108,000, or $2118 for each bell, or to break it down still farther $1 per pound. Wait, you have not heard all. On a rising note of triumph you learn that six United States copper companies furnished the metal. United States Steel and Ford Motor donated the mountings. The whole promotion stunt—now listen carefully—won't cost the Treasury a cent! Isn't that just ducky?

The average reader, assuming there is such a person, would gather the general impression that particularly high-minded, altruistic and patriotic citizens engineered the deal for the honor and glory of God, the comfort, convenience and well being of their fellow citizens and for proper recognition in the head lines.

Unfortunately, and apparently, they had not read—or if read had not heeded—an editorial in the April issue of THE FOUNDRY. The following excerpt indicates the general trend:

What are some of the factors which should be considered necessary in building greater markets for castings? First, to do an intelligent job selling, the foundry must produce a top quality product and must have controls to maintain the quality day after day and from shipment to shipment. Much has been done in quality improvement and control during the past decade, but in many respects the job has been only started **** To compete successfully, especially with other products, castings must do an equal or better job.

How does all this apply in the present instance? The bid of a company whose long and distinguished career guaranteed high quality castings was rejected because the price was a little higher than that of the foreign firm, and this in turn hinged on the clause specifying an early delivery date. To get the order out in time would involve the construction of several new flasks, partial dislocation of other work in progress and the hiring of additional help. Naturally and legitimately the foundryman felt that the additional cost of meeting a definite deadline should be charged to the order.

The most extraordinary feature in the entire transaction is the apathy displayed by United States foundrymen. Individually and collectively through their various organizations they should have protested the action of certain men in placing an $108,000 order overseas, because, forsooth, they patriotically did not like to burden the treasury, bursting at the seams with sacrificial taxes, with the expenditure—to quote the eminent Mr. John L. Lewis at another time and place—of 30 *lousy pieces of silver.*

Paul Revere
The Old North Church Yard
Boston, Mass.

* * *

Recommends Intelligent Selling

TO THE EDITORS:

I have read your editorial in the April issue of THE FOUNDRY, "Intelligent Selling Can Expand Casting Market."

I am so pleased about this, that I just wanted to drop you a letter and tell you that I think you have done the foundry business a service, if the foundrymen will just read and heed your article.

I have contended for years that the conversion of parts to castings is one that cannot be accomplished solely by sending out literature and engineering data. A designing engineer is a busy man, and when the casting industry has salesmen who can sit down alongside of the designing engineer and help him with his problems, we will see an increase in casting tonnage.

This is one of the reasons I am so enthused about the Foundry Educational Foundation work. We are going to have more technical men who can do that kind of a job in the industry, and more designing engineers coming out of the schools who know much more about castings.

Thanks—for the industry.

STOWELL WASSON
Manager, Melrose Park and
Chicago Works
National Malleable & Steel
Castings Co.
1400 *South* 52*nd Ave.*
Cicero 50, *Ill.*

* * *

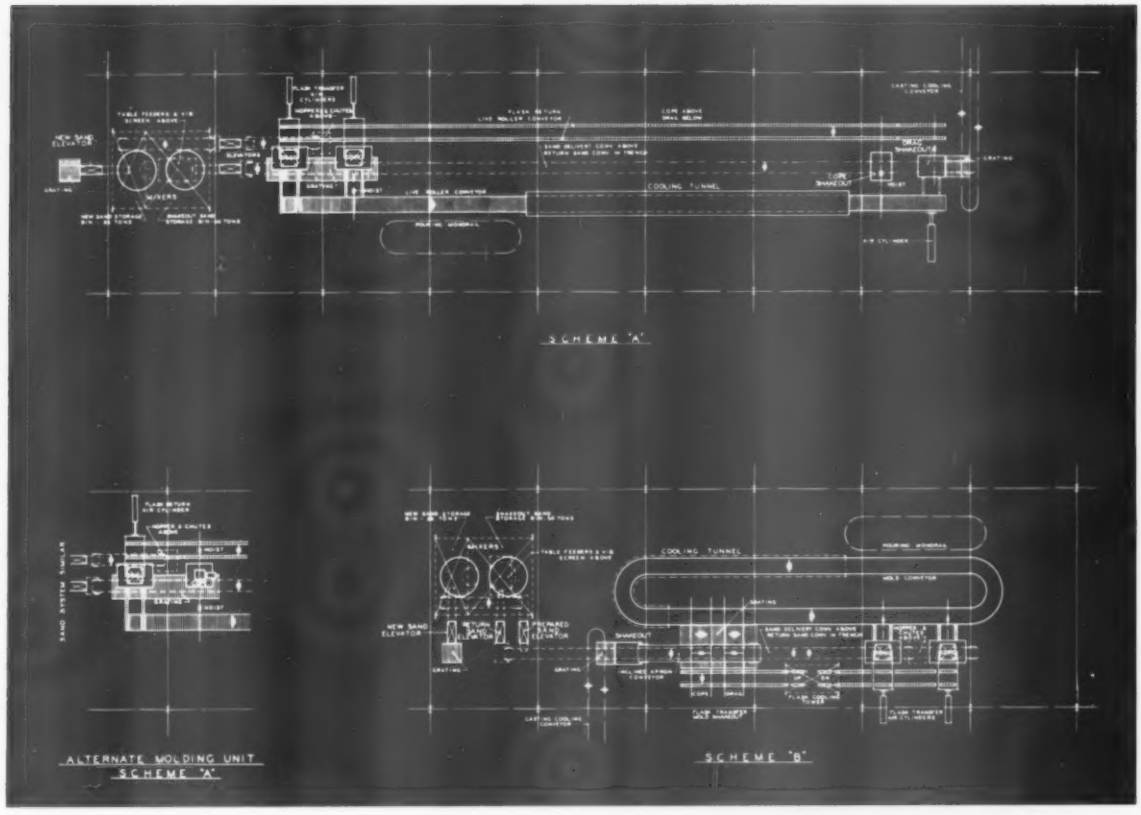
Repairing Cracked Bells

TO THE EDITORS:

In your March issue on page 100 you describe how a cracked bell may be welded.

In our experience, we have run across many cases where welding has been applied to cracked bells and are sorry to say that, in prac-

(*Concluded on page* 151)



COMPARATIVE STUDIES

These studies, prepared for a Midwestern foundry, were made to investigate possibilities of low-cost, high-quality production for a specialized product.

The solution to a production problem can quickly be determined by combining the owner's understanding of his methods and practices with the technical ability and experience of Giffels & Vallet, Inc.

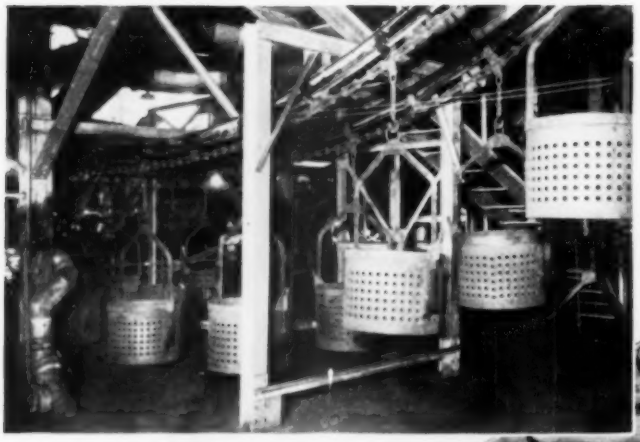
Our foundry engineers are available to assist *you*. We will gladly, without obligation, discuss your engineering problems and the assistance we can render.

GIFFELS & VALLET, INC.

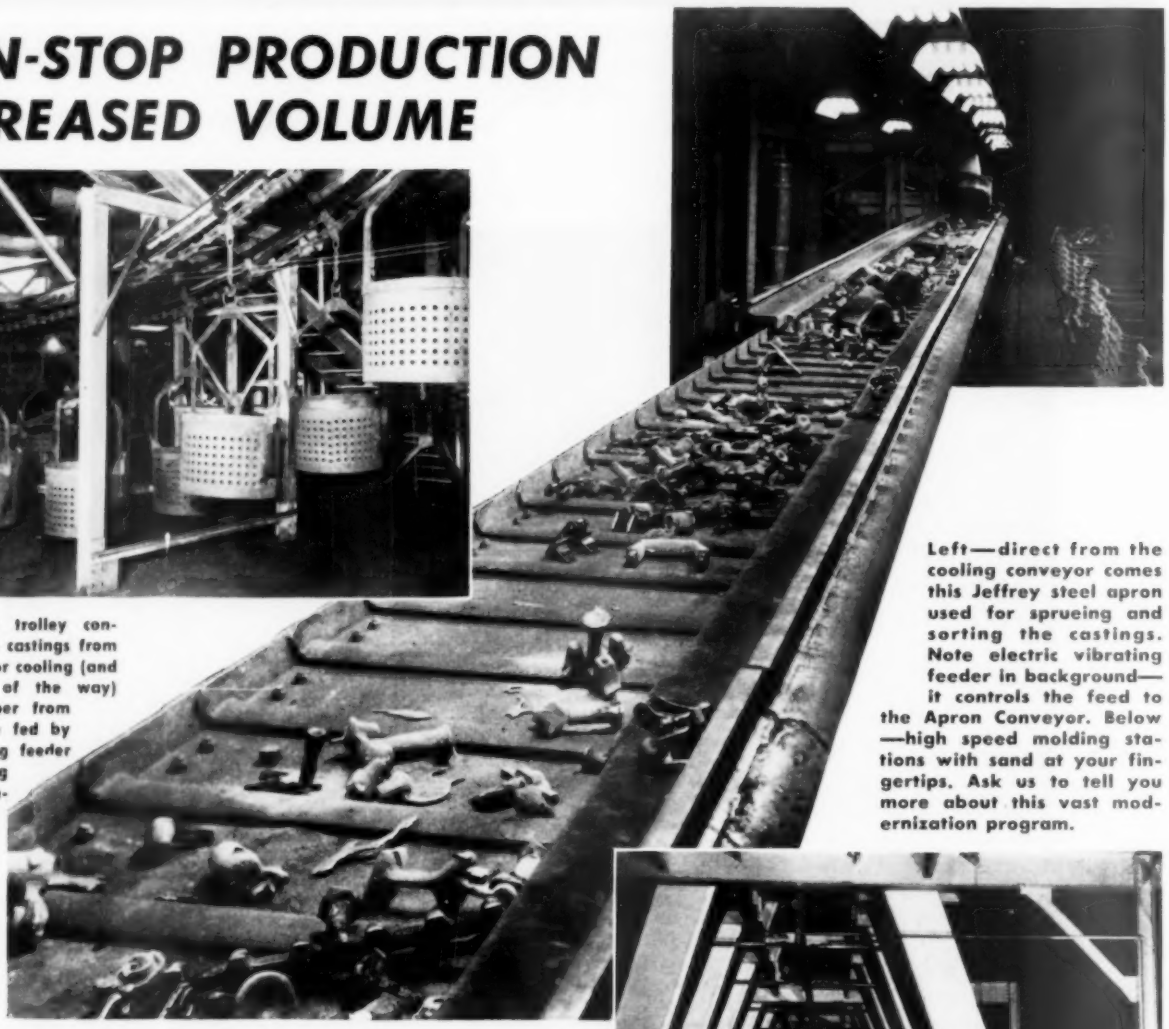
INDUSTRIAL ENGINEERING DIVISION
1000 MARQUETTE BUILDING, DETROIT

COMPLETE MECHANIZATION *Proves Out*

NON-STOP PRODUCTION INCREASED VOLUME



Above—Jeffrey trolley conveyors take the castings from the shake-out for cooling (and overhead out of the way) thence to hopper from which they are fed by electric vibrating feeder to the sorting and sprueing conveyor (right).



Left—direct from the cooling conveyor comes this Jeffrey steel apron used for sprueing and sorting the castings. Note electric vibrating feeder in background—it controls the feed to the Apron Conveyor. Below—high speed molding stations with sand at your fingertips. Ask us to tell you more about this vast modernization program.

Completely modernized and Jeffrey-equipped throughout, this large Malleable Foundry has the facilities to turn out large quantities of castings quickly . . . is set up to meet today's prices. Yes, some Jeffrey unit is in there doing its bit to speed the process all along the line (see photos). And you'll like the way Jeffrey Foundry Engineers step up production . . . the way they coordinate each unit to provide peak efficiency and increased volume. A complete line of equipment to make your foundry (small or large) as modern as possible. Let us show you what we can do.

JEFFREY FOUNDRY ENGINEERS *are Specialists*

THE JEFFREY MANUFACTURING COMPANY

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Complete Line of Material Handling, Processing and Mining Equipment

JM

Baltimore 1	Buffalo 2	Cleveland 13	Harlan	Jacksonville	Pittsburgh 22
Birmingham 3	Chicago 1	Denver 2	Houston 5	Milwaukee	St. Louis 3
Boston 16	Cincinnati 2	Detroit 13	Huntington 19	New York 7	Salt Lake City 1
				Philadelphia 3	Scranton 3

(*Concluded from page* 148)

tically every instance, the results have not been successful. We are speaking of large bells of tower size.

Not long ago, an historic bell belonging to Yale University was sent to us with a crack and a very successful mechanical repair was made by the use of the Metalock process which draws the two edges together and does not require the application of heat. Since we had no knowledge of the original tone, it was impossible for us to tell whether that was restored.

In the answer, you mention the fact that the diameter and thickness of the metal are factors in determining the final tone of a bell which is a proven fact. We also believe that there are certain stresses within a bell which enter into the final result. A crack would relieve these stresses and it is doubtful if welding would reproduce them.

Bell metal normally consists of 22 per cent tin and 78 per cent copper which makes it a very brittle material. Welding a large bell, which cannot be preheated would be a very delicate operation and it is possible that the crack would extend faster than it could be filled in.

CLINTON MENEELY
Vice President

Meneely Bell Co.
Troy, N. Y.

* * *

High Temperature Sand Testing

TO THE EDITOR:

The article, "Steel Foundry Core and Molding Sands," in THE FOUNDRY, April issue, is very good.

Reports of the AFS Committee on Physical Properties of Iron Foundry Molding Materials at Elevated Temperatures give interesting sidelights on the subject. The 1948 report on rat tails, found in the 1949 AFS *Transactions*, gives a graph showing relationship between rat tails and hot strength-expansion. This graph also holds for buckles with which steel foundries are troubled. This same committee had a 1949 report on scabs which was presented at the 1949 convention.

A study of these reports would cause one to give more credit and emphasis to hot properties of foundry sands. Our laboratory has found much application for hot properties of molding sands and cores in steel foundries. These are in line with consulting work and therefore are not published. It would seem that this article and future ones in this series should speak better of high temperature testing.

The 2 x 2 specimen was not used in high temperature testing, not because it was expensive, but because this size specimen spalls and cracks badly and thus it was difficult to obtain a good hot strength test. It is true that the 1⅛-in. specimen allows the use of a lower price equipment but this was not the reason I chose to use it. One can obtain much greater reproducibility with this size of specimen. I found that the 1⅛-in. specimen spalling can be correlated with that in a mold or core.

HARRY W. DIETERT
Harry W. Dietert Co.
9330 Roselawn Ave.
Detroit

OBITUARY

WILLIAM F. Bornfleth, 61, foundry manager, Cutler-Hammer Inc., Milwaukee, died Apr. 21, at the Mayo clinic, Rochester, Minn., following an illness of several months. Mr. Bornfleth, a native of Milwaukee, joined Cutler-Hammer at the age of 14. From 1915-1919 he was in charge of casting purchases. He was secretary-manager, Cream City Foundry Co., Milwaukee, from 1919 until 1930, when it was acquired by Cutler-Hammer, and he became foundry manager. Mr. Bornfleth served as first president of the Wisconsin Chapter, AFS, in 1935-1937.

* * *

George F. Crivel, 84, for the past 60 years a salesman of foundry supplies, died recently in Buffalo. Mr. Crivel was born in Richmond, Ind. At the age of 24, after traveling with a minstrel show, he became associated with the S. Obermayer Co., Chicago, and remained with that organization until 1905 when he formed George F. Crivel & Co., Buffalo, to handle clays, sands, and other foundry supplies.

* * *

Edward L. Fehring, 67, former secretary-treasurer, Ohio Pattern Works & Foundry, Cincinnati, died April 11, at his home there. Mr. Fehring retired from the company 3 years ago following 42 years of service. For the past year he and his son have operated the Fehring Hardware Co., Bridgetown, O.

* * *

August N. Kelley, retired foundryman, died May 8, at Ocala, Fla., following an illness of five months. Mr. Kelley for many years was general superintendent of the Modern Foundry, Oakley, O., later acquired by the Cincinnati Milling Machine Co., Cincinnati. During the recent war he was associatied with Pottsville Casting & Machine Shops Inc., Pottsville, Pa., engaged in marine cylinder work. His home for the past two years was at Oklawaha, Fla., a small town close to Ocala.

* * *

Hiram C. Nicholas, 56, president Quality Castings Co., Orrville, O., died in Deaconess Hill Hospital, Boston, following a short illness. Mr. Nicholas was a foundry supply salesman in Hamilton, O., until 1933, when he became manager of the castings company. He became interested in profit-sharing plans and was active in the Council of Profit-Sharing Industries.

* * *

L. D. Holland, 46, assistant to the president and a director, E. F. Houghton & Co., Philadelphia, died Apr. 14, following a long illness. Mr. Holland attended Coe College, Iowa, and joined the company in 1927 as a sales representative. He subsequently became western division sales manager, manager of research sales and assistant general sales manager.

* * *

Raymond T. Melville, 67, district sales manager, Hanna Furnace Corp., Buffalo, died Mar. 29, following a long illness. Mr. Melville joined the company in 1927 as a salesman and became district sales manager last year. He was a former director of the Western New York Chapter of the AFS.

* * *

Ellwood F. Thum Sr., 64, president, Palmyra Foundry Co., Palmyra, N. J., and founder of Abrasive Alloy Castings Co., Bridgeboro, N. J., died Apr. 10 at his home in Ormond Beach, Fla. Mr. Thum had been associated with the foundry industry for the past 48 years.

* * *

Randall E. Moyle, 50, president, Chester Iron & Foundry Co., St. Louis, died April 15 as the result of an automobile accident.

* * *

Albert J. Lent, 51, general superintendent, United States Graphite Co., Saginaw, Mich., died Apr. 5. A graduate of University of Michigan, Mr. Lent joined the company in 1922.

* * *

John H. Barrett, president, Sterling Pattern Works, Rochester, N. Y., which he founded in 1924, died Apr. 16.

* * *

Edward C. Strong, 84, one of the founders and former vice president, Atlas Steel Casting Co., Buffalo, died Apr. 17.

* * *

Leroy W. Luff, 50, for 27 years a metallurgist with International Nickel Co., New York, died Mar. 23.

for **1.** Assured Core Support **2.** Maximum Fusion **3.** Freedom From Leakers **4.** Accurate Wall Thicknesses use

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FEATHEREDGE FUSION RINGS

Knife-like multiple Rings heat instantaneously to fusion temperatures—burning in and eliminating leakers.

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Molten metal lays up solidly against the rounded bases of the radius grooves. Greater chaplet area contact results in maximum fusion. No sharp threads to trap gases or weaken stem strength.

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Patent Pending

For 56 Years Fanner Chaplets have been the standard of excellence in the foundry industry. In an effort to produce an even better chaplet, The Fanner Manufacturing Company commissioned the Battelle Memorial Institute, Columbus, Ohio, to conduct *exhaustive studies of chaplet design.* Based on these studies, supplemented by field tests in leading foundries, Fanner Manufacturing Company has developed the new Groovestem chaplet and has redesigned the Famous Superstem, further insuring the maximum in core support and completeness of fusion.

FANNER MFG. CO., CLEVELAND 1, OHIO

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STANDARD SPECIFICATIONS FOR GRAY IRON CASTINGS

ASTM Designation: A 48-49. Adopted, 1936; Revised, 1941, 1948, 1949

SCOPE

1. These specifications cover general gray iron castings not covered by other existing specifications of the American Society for Testing Materials and apply to gray iron castings where strength is a consideration. It is a purpose of these specifications to classify cast irons in respect to tensile strength.

TENSILE STRENGTH CLASSIFICATION

2. Gray iron castings conforming to these specifications shall be known and listed by classes (Notes 1, 2, and 3), according to the minimum requirements as to tensile strengths of test bars as follows:

Class	Tensile Strength, min., psi.
No. 20	20,000
No. 25	25,000
No. 30	30,000
No. 35	35,000
No. 40	40,000
No. 50	50,000
No. 60	60,000

TENSION TEST

3. The tension test shall be considered the primary test for qualification under these specifications. Unless there is agreement between the manufacturer and the purchaser to the contrary, the tension test shall be made and the results of the tension test shall determine compliance with the specifications for the various classes given in Section 2.

TRANSVERSE TEST

4. (a) By agreement between the manufacturer and the purchaser, the tension test may be waived and the transverse test may be specified. When specified, the breaking loads prescribed in Table I shall apply.

(b) By agreement between the manufacturer and the purchaser, deflection values in the transverse of flexure test may be specified (Note 4).

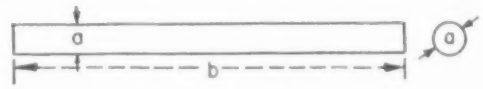
(c) The transverse or flexure breaking loads prescribed in Table I are based on actual averages of transverse test loads for each class of casting.

TABLE I—Transverse or Flexure Breaking Loads

Transverse or flexure test bar / Span length	0.875 in. in diameter 12-in. supports	1.2 in. in diameter 18-in. supports	2.0 in. in diameter 24-in. supports
Class	Breaking Load at Center, min., lb.	Breaking Load at Center, min., lb.	Breaking Load at Center, min., lb.
No. 20	900	1,800	6,000
No. 25	1,025	2,000	6,800
No. 30	1,150	2,200	7,600
No. 35	1,275	2,400	8,300
No. 40	1,400	2,600	9,100
No. 50	1,675	3,000	10,300
No. 60	1,925	3,400	12,500

It is not implied by these specifications that the ratio of tensile strength to transverse load is constant. By agreement between the manufacturer and the purchaser, tensile strength and transverse tests may be made and a range of transverse values determined. These values will then supersede the values prescribed in Table I.

(d) Where the transverse test has been made by agreement as prescribed in Paragraph (a) and the transverse or flexure test bar fails to meet the load requirements prescribed in Table I or the values determined in accordance with Paragraph (c), then the manufacturer shall have the right to have tested a tension test specimen machined from the broken end of the transverse test bar. If this tension specimen conforms to the requirements of the specified class, as given in Section 2, the class requirement shall be considered as having been met, irrespective of the transverse or flexure breaking load.



Transverse Test Bar	Dimensions — Diameter, in.	Dimensions — Length, in.	Between Supports in Transverse Test, in.
A	0.875	15	12
B	1.20	21	18
C	2.00	27	24

Fig. 1—Transverse or Flexure Test Bars

TEST BARS

5. Test bars shall be cast separately from the casting. Three standard sizes of transverse or flexure test bars are available under these specifications as shown in Fig. 1 (Note 5). Tension test specimens shall be machined from the transverse test bars to the dimensions shown in Fig. 2.

CORRELATION OF TEST BAR AND CASTING

6. (a) The manufacturer and the purchaser shall agree upon the controlling section of the casting. Then the corresponding test bar shall be used as follows:

Controlling Section of casting, in.	Test Bar	Nominal Diameter of Test Bar as Cast, in.
0.50 and under	A	0.875
0.51 to 1.00	B	1.20
1.01 to 2.00	C	2.00
Over 2.00	Test bar C may be used or a larger test bar may be used by agreement between the manufacturer and the purchaser.	

STANDARD SPECIFICATIONS FOR GRAY IRON CASTINGS

ASTM Designation: A 48-49. Adopted, 1936; Revised, 1941, 1948, 1949

(b) The correlation in Paragraph (a) is only approximate and may need modification for complicated castings. The test bar size for a given casting may then be determined by agreement between the manufacturer and the purchaser.

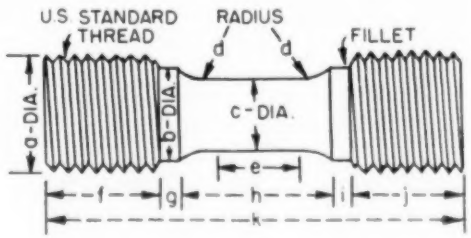
(c) When the controlling section is very heavy in comparison to other sections of the casting and if maximum strength is sought in the controlling section, it is possible that chilled spots may be found in the light sections. In such cases it may be necessary to (1) use a lower strength class for the controlling section, or (2) modify the design to provide more section uniformity.

MOLDING AND POURING TEST BARS

6. Unless otherwise agreed upon by the manufacturer and the purchaser, test bars shall be made under the same sand conditions as the castings (Notes 5 and 6). The bars shall be poured from ladles of iron used to pour the castings. The test bars shall receive the same thermal treatment as the castings. In the case of heat treatment, the test bars shall be treated adjacent to the castings they represent.

TENSILE STRENGTH TEST PROCEDURE

7. Tension test specimens (Fig. 2) shall fit the holders of the testing machine in such a way that the load shall be axial. The use of self-aligning shackles is recommended (Note 7). After reaching a stress equivalent to 15,000 psi, the speed of the moving head of the testing machine shall not exceed $\frac{1}{8}$ in. (0.125 in.) per min.



Dimensions of Tension Test Specimens, in.

Dimension	Specimen A	Specimen B	Specimen C	Dimension	Specimen A	Specimen B	Specimen C
a	$\frac{3}{4}$	$1\frac{1}{8}$	$1\frac{7}{8}$	f	1.00	1.00	$1\frac{3}{4}$
b	$\frac{5}{8}$	$\frac{7}{8}$	$1\frac{7}{16}$	g	0.25	0.25	$\frac{7}{16}$
c	0.505	0.750	1.25	h, min.	1.25	1.50	$2\frac{1}{4}$
d	1.00	1.00	2.00	i	0.25	0.25	$\frac{7}{16}$
e*	Shall be equal or greater than c (diameter)			j	1.00	1.00	$1\frac{3}{4}$
				k, min.	3.75	4.00	$6\frac{3}{8}$

* Length of parallel.

Fig. 2—Tension test specimens machined from transverse of flexure test bars

TRANSVERSE TEST PROCEDURE

9. (a) The transverse or flexure test shall be made on the bar as cast, or as skin machined (providing in the latter case that the diameter is not reduced below the minimum sizes prescribed in Table II) with central loading between supports. Corrections shall be made for sizes of round bars as prescribed in Table II. In case of slightly elliptical bars (maximum and minimum diameters both within the permissible variations prescribed in Table II), loading shall be on the minimum diameter, and the correction factor shall be obtained as follows: Square the depth of the bar measured at the point of application of the original load, multiply by the width, and divide the product by the cube of the diameter of the standard or nominal size bar. A bar whose diameters (maximum and minimum) vary by more than 0.025 in. for the 0.075-in. diameter nominal size, or by more than 0.050-in. for the 1.2 and 2.0-in. diameter nominal sizes, respectively, shall be considered a slightly elliptical bar.

TABLE II—Correction Factors for Transverse or Flexure Test Bars

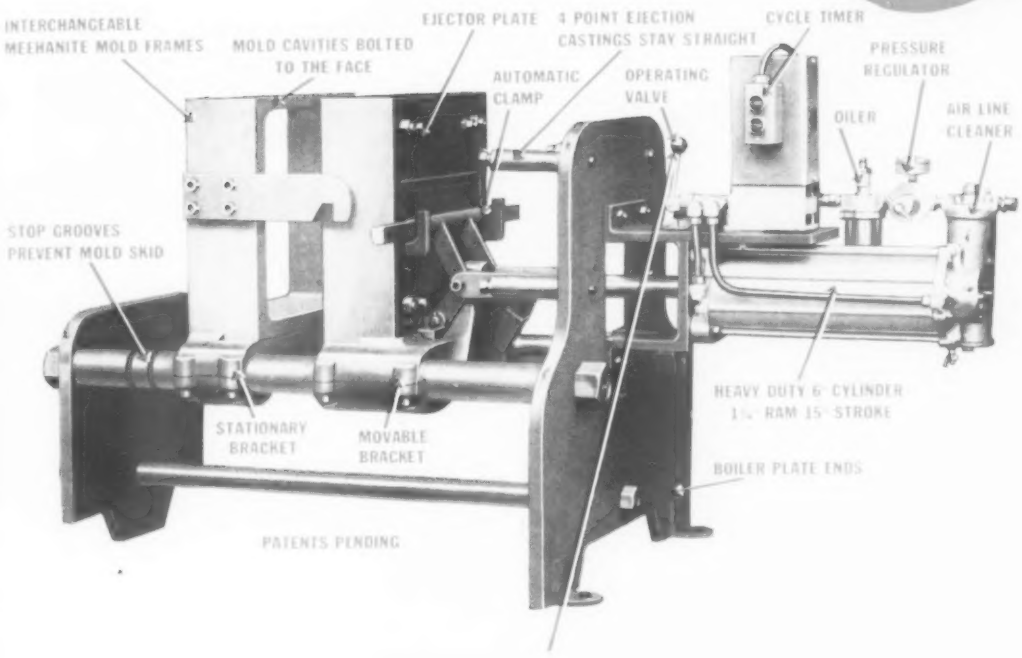
In order to correct to the standard diameter, the breaking load and deflection obtained in testing the bar shall be divided by the respective correction factors.

Test Bar A, 0.875 in. in Diameter			Test Bar B, 1.20 in. in Diameter			Test Bar C, 2.00 in. in Diameter		
Diameter of Test Bars, in.	Correction Factor Load	Correction Factor Deflection	Diameter of Test Bars, in.	Correction Factor Load	Correction Factor Deflection	Diameter of Test Bars, in.	Correction Factor Load	Correction Factor Deflection
0.825	0.838	1.061	1.10	0.770	1.091	1.90	0.857	1.053
0.830	0.853	1.054	1.11	0.791	1.081	1.91	0.871	1.047
0.835	0.869	1.048	1.12	0.813	1.071	1.92	0.885	1.042
0.840	0.885	1.042	1.13	0.835	1.062	1.93	0.899	1.037
0.845	0.900	1.036	1.14	0.857	1.053	1.94	0.913	1.032
0.850	0.916	1.029	1.15	0.880	1.043	1.95	0.927	1.026
0.855	0.933	1.023	1.16	0.903	1.034	1.96	0.941	1.021
0.860	0.949	1.017	1.17	0.927	1.026	1.97	0.955	1.015
0.865	0.966	1.012	1.18	0.951	1.017	1.98	0.970	1.010
0.870	0.983	1.006	1.19	0.975	1.009	1.99	0.935	1.005
0.875	1.000	1.000	1.20	1.000	1.000	2.00	1.000	1.000
0.880	1.017	0.994	1.21	1.025	0.992	2.01	1.015	0.995
0.885	1.034	0.989	1.22	1.051	0.984	2.02	1.030	0.990
0.890	1.051	0.983	1.23	1.077	0.976	2.03	1.046	0.985
0.895	1.069	0.978	1.24	1.103	0.968	2.04	1.061	0.980
0.900	1.087	0.972	1.25	1.130	0.960	2.05	1.076	0.976
0.905	1.106	0.967	1.26	1.158	0.952	2.06	1.092	0.972
0.910	1.125	0.962	1.27	1.185	0.945	2.07	1.109	0.967
0.915	1.143	0.956	1.28	1.214	0.938	2.08	1.125	0.962
0.920	1.162	0.951	1.29	1.242	0.930	2.09	1.141	0.957
0.925	1.181	0.946	1.30	1.271	0.923	2.10	1.158	0.952

(To be concluded in July)

MASTER PNEUMATIC DRAW TABLE

for Aluminum Permanent Molds



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Pour the metal and the automatic timer takes over —releases the cavity blocks and ejects the casting with no attention from the operator.

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DESIGNERS AND MANUFACTURERS OF PERMANENT MOLDS, WOOD AND METAL PATTERNS AND MODELS

By EDWIN BREMER

Foundry DEVELOPMENTS

EXTREMELY interesting phase in the study of basic linings for cupolas is that reported by Sam F. Carter, American Cast Iron Pipe Co., Birmingham, at the recent annual convention of the American Foundrymen's Society. This was the use of quantities of calcium carbide in the coke bed when the cupola was being operated to remove sulphur from the metal charge. The carbide additions increased sulphur removal, increased carbon pickup, increased temperature and decreased oxidizable elements. For example, it permitted the production of a 0.016 per cent S final from a 0.134 per cent S all-scrap charge with 6 per cent carbide. In another it produced an 0.026 per cent S final and 3.50 per cent TC from an all-steel charge with 3 per cent carbide. In still another the increase in temperature was enough to melt at 2900° F, charges that could not be melted over 2800° F without carbide. The heat producing ability of carbide has permitted coke reductions to one-third normal with the same melting temperature and output increased 40 per cent.

* * *

ZINC, now can be made as strong as brass, according to Dr. R. H. Harrington, General Electric Research Laboratory, who accomplished that result through small additions of copper and beryllium to zinc. New alloy is said to have the same strength and electrical characteristics of brass, and is called "zncube" (pronounced zin-cue-be) from the chemical symbols of its make-up. Applications of the alloy include lamp and fuse sockets and bases, panels, containers, mild springs, and many forms of hardware. Alloy is said to machine, solder and resistance weld easily.

* * *

RECOMMENDED pouring rate for chill-cast tin-bronzes, as given in a booklet, "How To Make Improved Chill Cast Tin-bronzes," published by Tin Research Institute, is $R = KP$ where R is the pouring rate in lb per minute, P is the periphery of the mold cross section in in. (in the case of cored sticks use the periphery of the mold plus the periphery of the core), and K is a constant depending on the composition. Values of K are as follow: For 3 to 7 per cent Sn with less than 0.15 per cent P, 2.6; with 0.15 to 0.5 per cent P, 1.9; with over 0.5 per cent P, 1.6. For 7 to 12 per cent Sn with less than 0.15 per cent P, 1.9; with 0.15 to 0.5 per cent P, 1.6; with over 0.5 per cent P, 1.3. For tin over 12 per cent with less than 0.15 per cent P the value of K is 1.6; with 0.15 to 0.5 per cent P, 1.3; and with over 0.5 per cent P, 1.0.

* * *

NEW foundry method in producing centrifugally cast cylinder sleeves is in operation at Perfect Circle Corp., Richmond, Ind. Castings are gray as cast and require no annealing. Process is result of nearly 10 years' research and development work. Spinning machine was designed by the firm's engineers and metallurgists, and handling of all molds is completely automatic. Spinning time, die coating consistency and thickness, and mold temperature are controlled automatically. Machine also is said to provide an ingenious shakeout arrangement. Outer and inner diameters of the sleeves can be held to plus or minus 1/32-in., length to plus or minus 1/64-in., and stock allowed for clean-up is ⅛-in. on the outer and 3/16-in. on the inner diameter. Chemical components of the sleeve castings include 3.20 to 3.45 per cent TC, 2.0 to 2.40 per cent Si, 0.12 per cent max S, 0.25 per cent max P, 0.50 to 0.80 per cent Mn, 0.25 to 0.65 per cent Cr, 0.40 to 1.0 per cent Cu, 0.40 to 1.0 per cent Ni, and 0.10 to 0.50 per cent Mo. Hardness of castings currently in production ranges from 229 to 269 brinell, but those in higher brinell ranges are available. Minimum tensile strength is 40,000 psi.

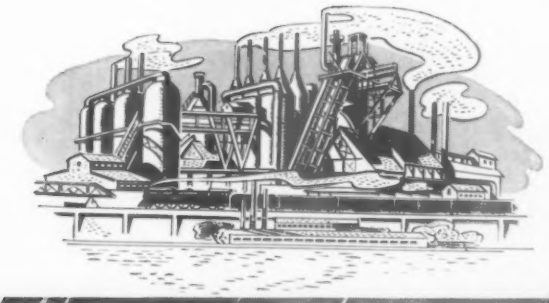
Notching riser on a gray iron casting with a new type reinforced hub abrasive wheel to facilitate knocking it off. Wheels operate at a peripheral speed of 11,000 surface feet per minute. Photograph courtesy Norton Co., Worcester, Mass.

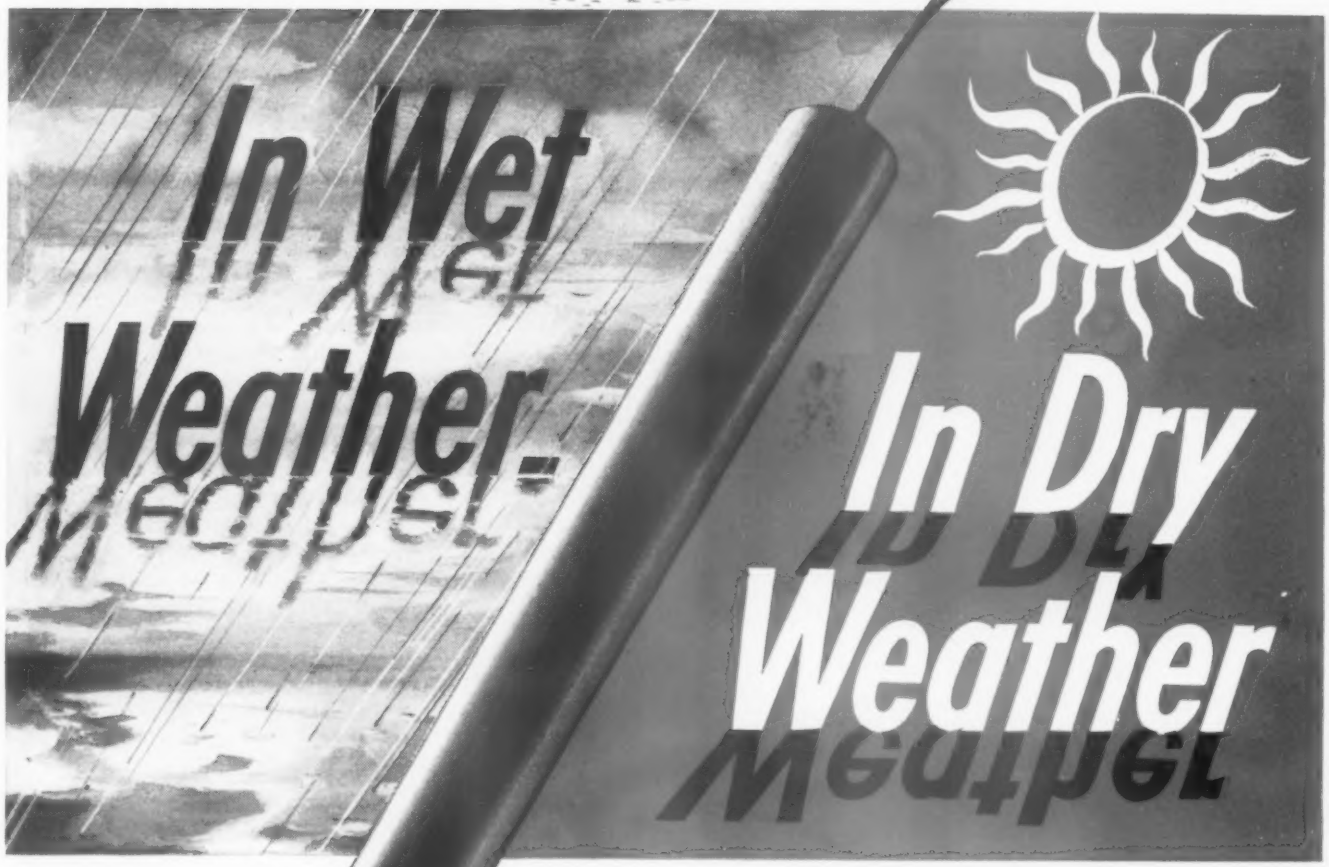
* * *

FOUNDRIES using soda ash in the ladle for desulphurization undoubtedly will be interested to know that rammed tar-dolomite lining for the ladles has met with considerable success in Great Britain. Material is said to give an exceptionally long life without erosion difficulties. Some slight erosion occurs on first use, when it becomes covered with a slag coating which prevents further erosion. To eliminate spalling and sloughing off when the ladle is not in use overnight and week ends, it is up-ended over a sand seal to prevent access of air and reduce the heat loss.

* * *

BRAZING of gray iron or malleable iron to steel tubing, steel stampings, etc., requires that any graphitic carbon, scale, etc., be removed from the joint surface of the cast part to insure an effective joining of the two materials. It is claimed that this is accomplished successfully through use of a two-bath procedure which leaves a clean surface, easily wetted by metal on the casting. One bath is a molten mixture of oxidizing salts operating around 800° F in which the parts are immersed for a short period of time. After removal the parts are placed in an aqueous bath of reducing salts operating at 200 to 250° F which removes the slightly oxidized coating formed in the first bath. A rinse in boiling water leaves the piece ready for brazing. It is claimed that a similar procedure is being used to prepare cast iron parts for coating with aluminum by the dipping process.





"NATIONAL" Ground Anodes control underground corrosion positively!

Losses due to underground corrosion *on pipe lines alone* are estimated at $600,000,000 annually. Protect *your* buried or submerged metal structures, positively and economically, by installing "National" ground anodes.

Regardless of seasonal changes in soil resistance—regardless of whether the soil is wet or dry—"National" ground anodes afford perfect protection against corrosion.

They operate with a controllable electric circuit. In dry periods, simply raise the voltage. In wet periods, lower it.

"National" ground anodes have been used for more than 15 years. They outlast any other material. You don't have to dig them up every few years. For highest efficiency, pack "National" graphite backfill material around each anode in the bed.

For complete details, write to Dept. FO.

MORE THAN DOUBLE THE USABLE LIGHT!

The biggest news since the invention of flashlights—the brand new "Eveready" No. 1050 flashlight battery—gives more than double the usable brilliant white light for critical uses than any other flashlight battery we have ever made.

NO METAL CAN TO LEAK OR CORRODE

The terms "National" and "Eveready" are registered trade-marks of

NATIONAL CARBON DIVISION
UNION CARBIDE AND CARBON CORPORATION
30 East 42nd Street, New York 17, N. Y.

District Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

Foreign Department: New York, U. S. A.

These products sold in Canada by National Carbon Limited, Toronto 4

Oxygen cuts electric furnace melting costs over $2,000 per month

WEHR STEEL COMPANY, of Milwaukee, Wisconsin, wanted to compare the refining of acid electric steel using oxygen with that of their usual method — the use of iron ore. They hoped to reduce refining costs without affecting the quality of the finished steel.

Clarence Nolan and W. R. Lysobey, Airco Technical Sales Representatives, were called in and suggested a series of test heats using Airco oxygen. On the basis of these tests, it was found that the cost of Airco 99.5% pure oxygen is about the same as the iron ore it replaced . . . *but,* the savings in ferro manganese, heat time, electrodes and power were appreciable — amounting to more than $1.00 per ton melted on a monthly tonnage of about 2,000 tons. Furthermore, the high quality of the steel was maintained.

Additional savings were also enjoyed when the problem of handling and storing iron ore was eliminated.

The Wehr Steel Company was most pleased with these results and have adopted oxygen refining of acid electric steel as standard practice.

For technical assistance on this unique refining process or a copy of our folder "Oxygen In The Electric Furnace," please write to your nearest Airco office.

AIRCO **AIR REDUCTION**

Offices in Principal Cities

TECHNICAL SALES SERVICE — ANOTHER AIRCO PLUS-VALUE FOR CUSTOMERS

H. Kramer Purchases Ajax Metal

H. Kramer & Co., Chicago, has purchased the plant, equipment, inventory, metal trade marks, etc., of the Ajax Metal Co., Philadelphia, according to L. Chapman, president of the Kramer organization. The plant will be operated as the Ajax Metal Division of H. Kramer & Co.

Ajax Metal Co., founded in 1880, has been serving the metal industry for 70 years. As the Ajax Metal Division of H. Kramer & Co., the plant will continue the production of quality brass and bronze ingots, phosphor copper, babbitts and other alloys. No change is contemplated in operations or personnel. E. A. Ginkinger, for the past 32 years with the Ajax Metal Co., has been elected vice president and general manager of the Ajax Metal Division.

Will Act as Adviser

Dr. G. H. Clamer, president, Ajax Metal Co., has announced that the company is changing its name to Ajax Electro Metallurgical Corp., and with its associated companies, Ajax Electric Furnace Corp., Ajax Electrothermic Corp., Ajax Electric Co., and Ajax Engineering Corp., will continue in the manufacture of electric furnaces and equipment used in the metallurgical field. Dr. Clamer will remain as president of these four associated companies.

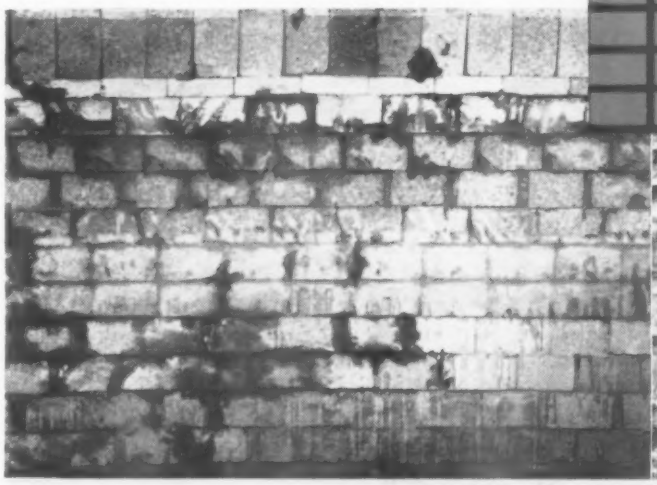
Dr. Clamer, world authority in his field, will act as technical adviser to both plants. He was the first chemist in the brass industry and is one of the real pioneers in the development of ingot brass and bronze. He is vice president and chairman of the executive committee of the famous old Franklin Institute of Philadelphia and chairman of its committee on research and development. He is chairman of the Bartol Research Foundation, devoted to researches in nuclear physics. He is a past president of the following national institutions: American Foundrymen's Society, American Institute of Metals and American Society for Testing Materials.

For many years Dr. Clamer has been chairman of the ASTM Committee on Copper Base Alloys for Sand Castings, also the committee on White Metals. These committees have developed the standard specifications for the industries in these fields. He has been chairman of the Metallurgists' Advisory Committee of the Brass and Bronze Ingot Institute since its founding. He is an honorary

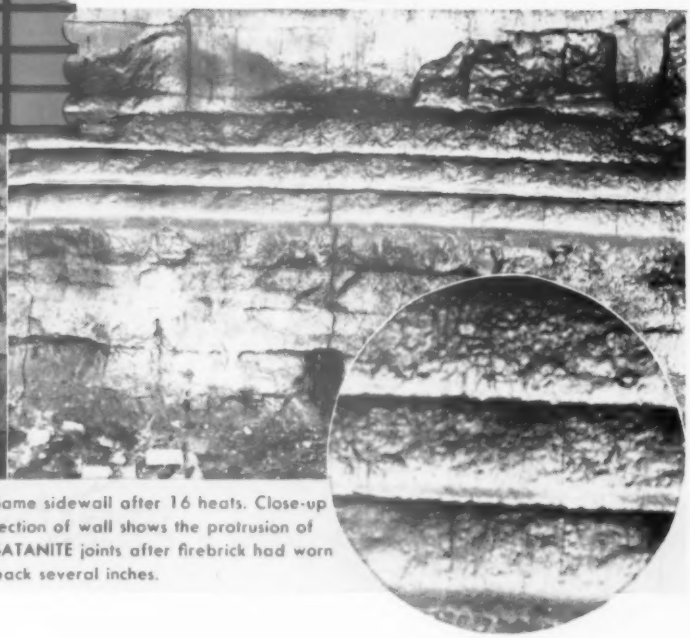
(*Concluded on page* 160)

SATANITE JOINTS PROVIDE
LONGER RUNS,
INCREASED PRODUCTION,
LOWER REFRACTORY COSTS

AFTER 16 HEATS SATANITE JOINTS PROTRUDE BEYOND THE FIRE BRICK SIDEWALLS



EMPIRE firebrick sidewall of malleable air furnace laid up with A. P. Green SATANITE. Note the thin brick-to-brick joints.



Same sidewall after 16 heats. Close-up section of wall shows the protrusion of SATANITE joints after firebrick had worn back several inches.

A large midwestern foundry reports excellent results from furnaces in which A. P. Green SATANITE slag resisting mortar was used in laying up the sidewalls. The above photographs clearly tell the story. A sidewall is shown immediately following installation and after 16 heats.

Note that after 16 heats, although the firebrick attacked by flame, slag and molten metal, has worn back several inches, the SATANITE joints still protrude ⅛ to ¼ inch beyond the surface. This enables the wall to wear back evenly and give added joint protection. Protection that pays off in lower refractory cost, longer runs and increased production.

In malleable air furnaces where sidewalls and bottom are laid up with SATANITE, any part of them can be easily removed for patching or rebuilding. Use SATANITE bonding mortar to increase the life of the lining in all types of malleable iron air furnaces, ladles, electric furnaces, cupolas, and hot metal mixers. Packed in 100-pound multi-wall bags.

Look for the name of your nearby A. P. Green Distributor in the yellow pages of your telephone directory or write us for further information.

A. P. Green REFRACTORY PRODUCTS

SERVE THE WORLD'S INDUSTRIES

OUR 40TH YEAR SERVING THE WORLD'S INDUSTRIES

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A. P. GREEN FIRE BRICK COMPANY, LTD.
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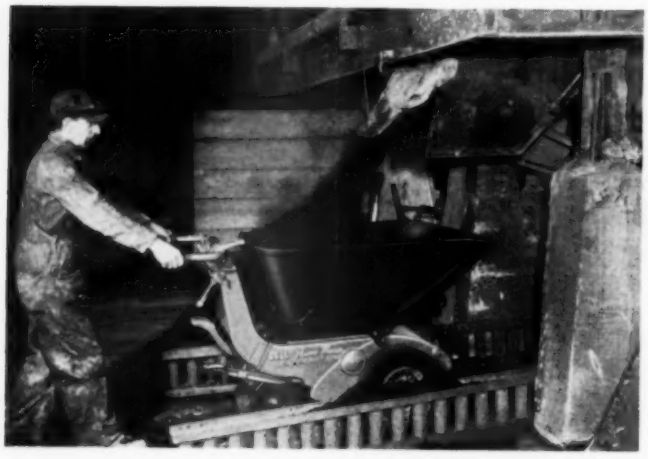
DISTRIBUTORS IN THE PRINCIPAL CITIES OF THE WORLD

The BELL Prime Mover

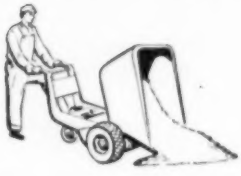
This Prime-Mover is loaded with iron foundry scrap. Easy to use in narrow aisles.



The BELL Prime Mover

The Prime-Mover handles a wide variety of foundry jobs with increased productivity, reduced fatigue.

YOU CAN KEEP THINGS MOVING



—with the PRIME-MOVER!

Gear driven—no belts or chains.

Engine protected against dirt.

Turns in its own length, 63½"; width 31½".

Converts from bucket to platform without tools.

Eight hours continuous running on 3 gal. of fuel.

Bucket holds 10 cu. ft.

THIS versatile machine is doing a remarkable job in many foundries. It can do the same for you. If some particular problem of material handling is bothering you—the Prime-Mover can answer that one and additionally help in a number of other ways, too. This rugged unit works outdoors and indoors to keep things moving. Here is a labor saver that has cut foundry handling costs as much as $36 a day. Mail coupon. We'll send you complete information at once.

THE PRIME-MOVER CO., Muscatine, Iowa

THE PRIME-MOVER CO., MUSCATINE, IOWA FY6

Gentlemen: Please send detailed information on the Bell Prime-Mover in foundries.

Your Name .....

Company .....

City ..... State .....

(*Concluded from page* 158)

member of the American Foundrymen's Society and one of the very small group elected to honorary membership in the American Society for Testing Materials. He is the recipient of the following medals: Joseph S. Seaman Gold Medal of the American Foundrymen's Society, awarded at the society's 1933 Chicago convention for his many and valuable contributions to the casting industry and particularly for his distinguished work in the field of nonferrous metallurgy; the Elliott Cresson Gold Medal of the Franklin Institute, awarded in 1904 for a process of utilizing waste metals.

British Foundry Conference

Over 200 foundrymen attended a three-day conference of the British Cast Iron Research Association, from Mar. 30 to Apr. 1, at Ashorne Hill, near Leamington Spa. Dr. J. E. Hurst, chairman of the council of the association, presided. Papers presented at the conference included: "Sampling for Chemical Analysis;" "Significance and Use of Chemical Results;" "Breakage of Castings in Transit;" "Chemical Laboratory Layout and Equipment;" "Application of Strain-gauge Technique to Stress Measurement in Iron Castings;" "Shrinkage and Porosity in Cast Iron;" "Exothermic Feeding Compounds;" "Factors Affecting Fluidity of Cast Iron;" "Nondestructive Testing of Castings;" "Corrosion of Cast Iron Boiling Pans;" "Rust Prevention on Ferrous Materials;" and "Use of Low Phosphorus Cast Iron for Thin Sections."

Purdue Foundry To Be Modernized

Purdue University, Lafayette, Ind., has approved plans for extensive modernization of its foundry. The largest engineering college in the United States, Purdue is one of 12 institutions co-operating with the Foundry Educational Foundation program. A. A. Potter, dean of engineering, stated that the modernization plans are intended to serve best the industries of the country as well as provide a laboratory in connection with engineering instruction. The foundry improvements are being made in accordance with recommendations made by the Purdue FEF Advisory Committee, of which Paul H. Harlan, Electric Steel Castings Co., Indianapolis, is chairman.

New CORE GRINDER

It's Faster... More Versatile

GRIND ONE CORE...
***at the same time* LOAD ANOTHER**

Model No. 71

The New Milwaukee Core Grinder handles a wide range of large cores, intricate or cumbersome. Equipped with dual grinding tables, this new machine enables the foundryman to load one core while grinding another core and leaves open head room for hoist lift. The husky, adjustable wheel arm swings progressively around a complete 360° circle to accommodate existing core handling systems at either one of the two grinding positions. Speeds up job. Increases foundry efficiency. For continuous core grinding operations, the balanced wheel arm may be securely locked into place. The column, grinding wheel and drive shaft are mounted on liberal sized, dust-proof, precision ball bearings. Construction throughout is simple and rugged, to insure smooth, vibrationless performance. No. 70 Core Grinder with rotating table for smaller cores, also available. Write for literature.

- 42" Grinding Wheel
- Simultaneous Loading and Grinding
- Vibrationless Performance
- Vertical Adjustable Wheel Arm and Wheel Guard
- Built with Machine Tool Precision
- Uses Minimum of Floor Space

WRITE FOR CATALOG

MILWAUKEE
3238 W. PIERCE STREET,

FOUNDRY EQUIPMENT DIV.
SPO INCORPORATED
MILWAUKEE 4, WISCONSIN, U. S. A.

Around DETROIT

Motor car production tops expectations, giving considerable impetus to makers of automotive castings . . . Output in first six months may reach as high as 3,700,000 cars and trucks

PRODUCTION of automobiles continues at a rate which was little dreamed of a year ago. Although the Chrysler Corp. was out of the picture from Jan. 25 to May 5, production of cars and trucks for the first four months exceeded 2,000,000. Observers believe the half-year total may reach as high as 3,700,000, barring further strikes within the automotive industry, or in industries upon which automobile producers depend for materials, components or services.

Captive foundries in the automobile field, as well as independent suppliers of automotive castings, are operating at a very high rate and every indication points to continuation of this production bulge for some time. Many car dealers report having backlogs, and new orders are developing at a rapid rate. Frequently delivery of cars to dealers does not keep up with new orders and there appears to be no reason for an early slackening in demand.

L. W. Smead, assistant general sales manager, Ford Division, Ford Motor Co., speaking before the Pacific Northwest Marketing Conference at Seattle on May 12 stated, "We don't think this 1949 and 1950 volume is a 'flash-in-the-pan.' We think high production volume will continue for several years and that there is a hard core of replacement and new business which will provide a market for profitable production for as far as we can see in the future."

* * *

FOUNDRIES are supplying some tonnage of cast armor to meet the needs for both the building and repair programs. For example, it is reported that the government's Detroit Arsenal now is engaged in a program which provides for production of 45-ton 17-46 General Patton tanks at the rate of four a day, and the reconditioning of smaller 25-ton medium tanks at the rate of two a day.

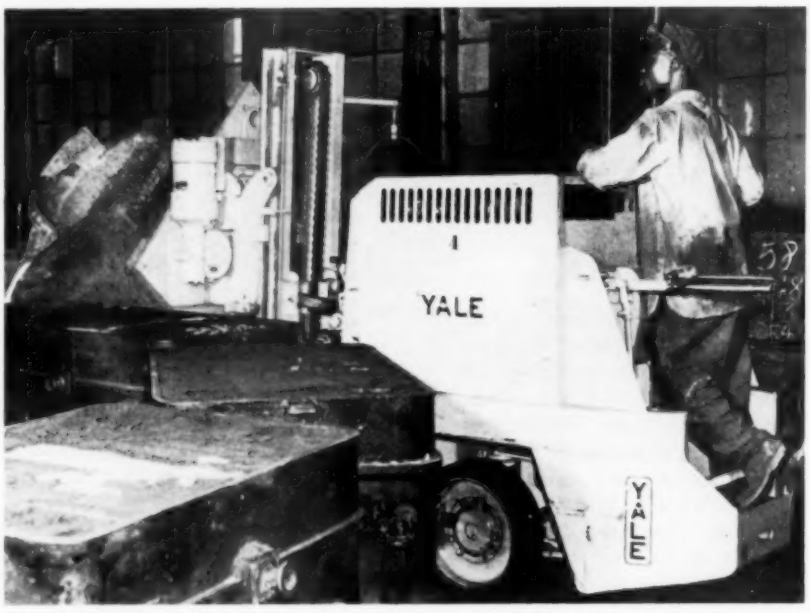
* * *

THE PRESS is stressing the fact that Otto Seyferth, new president of the Chamber of Commerce of the United States, is a foundryman and a former union organizer. While his interest in the foundry business extends over a period of 21 years, his experience with unions dates back much further. Mr. Seyferth first apprenticed himself as a machinist's helper, but after three years listened to the glowing picture of opportunities in the stone industry, and served his apprenticeship in that field.

But shortly after that one of the periodic economic tailspins hit the country and there was no work for the young stone carver. This first experience with a business recession, or a panic as they were called in those days, developed a latent curiosity concerning what brings on economic cycles and how the forces that cause business peaks and valleys operate. He is still studying the problem.

Lack of work in the stone field caused young Seyferth to return to the work of machinist and here he came in contact with the union. Beginning to display qualities of leadership, he became an active union worker, president of his local, president of the trades and labor council for his community and then a union organizer.

From here he enrolled in a correspondence course which included foremanship training, elementary and advanced accounting, banking and economics. After the first World War, he went to work for Bonbright & Co., and before long was traveling the country putting ailing companies on their feet. In 1929 he purchased a half interest in the West Michigan Steel Foundry Co., Muskegon, and three years later he became owner with the exception of a small block of stock held by the public. He employs 500 men and produces 1000 tons of steel castings a month, including railroad specialties, automotive, truck and trailer, tractor, farm implement cast steel flasks and miscellaneous castings.



POURING TRUCK: Fork lift truck is equipped with a 360-degree rotating carriage, which holds a ladle for transporting and pouring molten metal. All operations are controlled by the truck operator from his position at the rear of the truck, which is manufactured by Yale & Towne Mfg. Co., Philadelphia. Ladle base has four hollow rectangular steel tubes which permit the truck forks to pick up the ladle from any side. The ladle holds 4150 lb and is 34½ in. in diam by 39 in. high

a mechanized foundry benefits everyone

● In the Foundry Industry, as in all others, the advantages of mechanization are far-reaching. The production of more and better castings, at less cost, which is made possible by modern foundry equipment, benefits the foundry employees, management, the shareholders or owners and the purchasers of the products on which the castings are used. It might be an automobile, a home appliance, an outboard motor, a farm implement or any one of a thousand products which are made better by the use of castings. The application of modern foundry equipment, and the efficiency and economy which it creates, is bringing more good things within the reach of more people.

Well-planned conveyer systems are usually pretty important in foundry mechanization programs. Today, Mathews Engineers are making available to American and Canadian Foundrymen the benefit of long experience with foundry conveying problems. This, and the facilities of three modern plants, is yours for the asking. Write or wire today for catalogs. Engineers in all principal cities.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

MATHEWS CONVEYERS

GENERAL OFFICES . . . . . *Mathews Conveyer Company*
ELLWOOD CITY, PENNSYLVANIA

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SAN CARLOS, CALIFORNIA

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PORT HOPE, ONTARIO

Engineering Offices or Sales Agencies in Principal American and Canadian Cities

MAN·TO·MAN on the Molder's Bench

"The Secret Formula"

By RALPH L. LEE

I WAS just thinking that, with all the angles of the foundry business covered in some way or other at the convention and at all the other conventions held in the past —to say nothing of all the chapter meetings all over the country and back through all the years—a fellow can't help but think that foundry trade secrets by this time must be as much a thing of the past as the old one-horse shay.

Then after trudging along through all the exhibits it would be pretty hard to even think of one tiny little tool, from a slick clear on through the whole catalog to the largest electric furnace, that wasn't represented there. Also foundry materials of every kind and description.

After turning all this over in the old bean it struck me that, if a fellow knew where it was in our encyclopedia of books, *Transactions*, FOUNDRY articles and what have you, he could come close to finding the step-by-step recipe for success for any angle of the foundry business—from general management clear on through every department down to the kind of shoes and goggles a shakeout man ought to wear to be successful.

Wandering around in the situation of plenty the question suddenly hit me like a ton of brick, "If all the necessary know-how is within the reach of everyone, and if all the tools and materials are on tap, then how in heaven's name is it possible for some foundries to keep on marching way out in front of the crowd, come hell or high water, while others keep plodding along in the middle of the crowd of Also's.

Then it dawned on me that, as I go through all of the foundries I visit all over the country, it would be pretty hard for me to tell from what I can see or touch just what it was that spelled the difference between the leaders and the Also's. Whatever this difference is, and in spite of all the published know-how and wherewithal, it seemed to have all the earmarks of one of the old-fashioned trade secrets; that is, as far as the things I could see. But I'm willing to stick my neck out by saying that, while I can't see these telltale differences, I know darned well I can feel them. In fact, I can barely get through the front door of a foundry without this *feeling* leaking out to meet me like the smell of baking cores.

Sometimes this feeling takes the form of *standoffishness*. Sometimes it's sort of a sentry challenge, "Who goes there, friend or foe?" Other times it's, "So what." or "Just you start something." Then, thanks be, in other cases the feeling that greets me is one that says just as plain as words, "Come right on in, you've got the right place." or "You'll be glad you came, just wait and see."

Once in the place I never fail to find that the way I feel coming in fresh from the outside is exactly the way the folks inside feel toward each other, toward their jobs, their bosses and their company. The only thing is that, like the smell of core oil, everybody on the inside gets so used to it they forget that it's there.

I honestly believe that, with everything else being equal, the trade secret or the secret formula of why some outfits do trim the pants off their competitors will be found in the way their people feel. I, of course, am not saying that, regardless of feeling, it is not possible for some outfits by sheer dint of teeth gritting determination, cleverness—yes, even sharpness and smoothness—to give a darned good account of themselves in terms of dollars and cents. But in my humble opinion they are going at it the hard way.

There is no longer any question in my mind on this subject. In most cases the real reason for outstanding business performance in this highly competitive field of ours is largely that extra amount and quality of work—plus the added determination to lick tough problems an outfit will exert when it feels like letting itself go all out—over and above the amount an outfit half-heartedly and begrudgingly puts out who feels, "Oh! What the hell."

I wish I was as sure of everything else as I am of the fact that most of the profitable things people do are done:

Because they feel like doing them. Not because they think they are best, not because they are told to do them, not because they are bribed into doing them, or forced into doing them, but because they feel like doing them.

I am sure the profit producing feeling we are talking about can be traced directly to the opinion of those who have the say-so in an outfit as to what side their business bread is buttered on.

If the leaders of an organization are convinced that, when it is all said and done, they are the ones who are really doing the overall job, and that the job of those they have been forced to hire is to do what they are told and to carry out orders, then there is nothing in the world to prevent the feeling of rebellion against the part of servant they are forced to play from leaking out into that outfit and lopping off that extra which spells the difference between leaders and also-rans.

But on the other hand, the leaders of an organization who know what side their business bread is really buttered on look upon their success as a jig-saw puzzle with each piece, both large and small, in the hands of every individual in the place, from the lowliest to the mightiest, to either make or break.

With such a stand it follows as night follows day that eventually every worthwhile individual in the place who is worth his salt will feel he is needed and belongs; as a result he will take the talents he's got and shoot the works with them.

Talk about the miracles of what a fraction of a per cent of alloy can

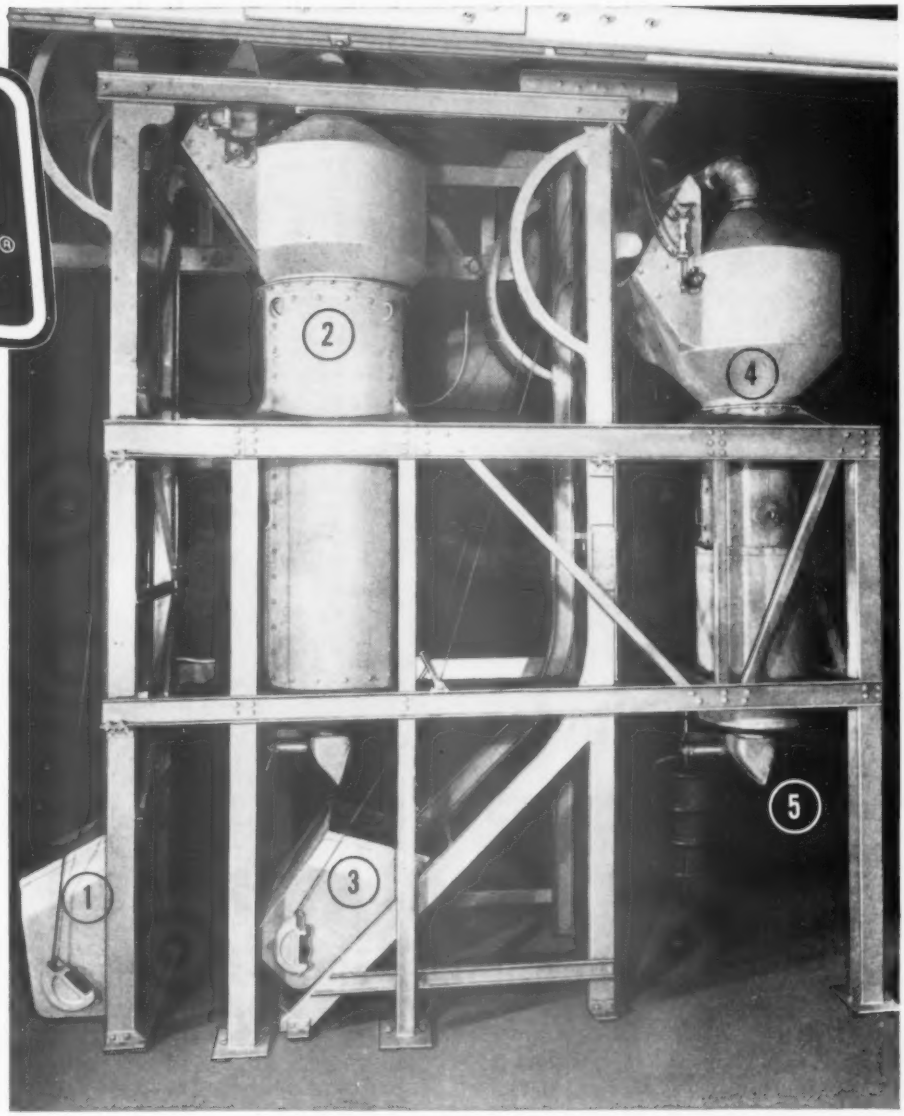
(*Concluded on page* 166)

The NATIONAL SAND DECARBONIZER®

. . . the Compact LOW COST Core Sand Recovery System *that will pay for itself in a short time*

• The new National Sand Decarbonizer has been developed over a ten year period by National Engineering Company. It represents the results of thousands of tests to obtain the lowest priced unit capable of saving the foundryman many times its original cost. It has been proved that, dependent on the cost of new sand and the volume available, the average foundry will be able to save the cost of this equipment in a little over a year and in some cases less. This does not include secondary benefits such as recovery of tramp iron, more uniform sand, self sufficient operation and many other benefits.

For full details, send for a copy of the new Decarbonizer Bulletin 504.



HERE'S HOW IT WORKS . . . Used sand is charged into bucket loader **(1)** which starts automatic cycle by dumping sand into reaction chamber **(2)**. Air at approximately 1700°F. is introduced into the chamber, causing sand to "boil", allowing intimate contact between sand and heated air. Carbonaceous materials are burned off, and scrubbing action also assists in removal of waste. After approximately 12 minutes, discharge valve at the bottom of the reaction chamber opens, and sand drops into the waiting bucket loader **(3)**. This loader again automatically elevates the sand, now at approximately 1000°F., to the cooling chamber **(4)** in which cooling air is forced down through a central pipe, permeating the sand, giving maximum cooling effect and dry scrubbing action. After a cooling cycle of 12 minutes the clear processed sand is discharged **(5)** ready to be reused by the foundry.

SIMPSON Intensive MIXERS

NATIONAL *Engineering Company*

608 Machinery Hall Bldg. • Chicago 6, Illinois

Manufacturers and Selling Agents for Continental European Countries—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd., Sydney, Australia

Figure Your Savings on SCREENING COSTS with the COMBS "V" Gyratory RIDDLE!

FASTER THAN 30 MEN

Sifts-Mixes-Fluffs-Aerates!

There's a sweet saving in the cost of screening Moulding and Core Sands, Medium, Fine and Sticky Materials when you use a Combs Model "V" or "V-5" Gyratory Foundry Riddle! Not only does it better—more uniform, cleaner—but saves you up to 97% of your labor cost!

Sturdy, simple to operate by one man, Combs Riddles cost less than 1c an hour for power. Fractional horsepower motor does the work. Quickly removable steel-rim sieves can be removed, emptied, replaced in seconds.

TYPE "V" (20" sieve) Complete $225
TYPE "V5" (36" sieve) Complete $400

Prompt Delivery from your Foundry Supply House

SEND FOR FREE DESCRIPTIVE FOLDER

Combs • Gyratory • Foundry • Riddles

GREAT WESTERN MANUFACTURING CO.
LEAVENWORTH, KANSAS, U. S. A.

(*Concluded from page* 164)

do to a melt, in my opinion it isn't in it compared with what a small per cent of the feeling of being recognized will do to an organization. Without belittling what we have accomplished along technical lines I for one am convinced that this field of *feeling* offers unlimited and dumbfounding opportunities. Gee! If I don't look out here I'll be getting downright evangelical. Well, anyway, this is the way I *feel*.

History Award for Lebanon Steel

For excellence of company publications promoting interests of the community, Lebanon Steel Foundry, Lebanon, Pa., has received the 1949 award of merit conferred by the American Association for State and Local History, Washington. Special recognition was accorded for publication of the illustrated pamphlet, "Lebanon County through the Centuries," and the company's unusual calendars for the years 1946 through 1949, which were designed to direct emphasis toward inspiring broader understanding of the industrial locale in which the company is an integral part. Credited with contributions to development of the historical theme, prepared under direction of William H. Worrilow, company president, are Miss Florence Starr Taylor, Lancaster, Pa., illustrator; Dr. Arthur D. Graeff, Philadelphia author and Pennsylvania-German authority; and Foltz-Wessinger Inc., Lancaster.

Issues Gray Iron Newsletter

Gray Iron Founders' Society has issued a bulletin entitled "Gray Iron Newsette," a newsletter to be distributed periodically to nonmember foundries to acquaint them with current society activities. Outlining items of information of interest to foundry executives, the paper will keep nonmembers abreast of society objectives and programs. Gray iron foundries desiring to receive regular copies may write to the society's office, 210 National City-East Sixth Bldg., Cleveland 14.

Nash-Christian Foundry Supply Co., 44 St. & Powell Ave., Birmingham, recently destroyed by fire, has resumed operations. The plant, which manufactures foundry facings, was completely redesigned and rebuilt.

New

McKEE

CONSTA-MIX PROPORTIONING VALVE

NOW **a new "high" in air-gas mixing**

ACCURACY · · · FLEXIBILITY · · · VERSATILITY

The Consta-Mix Proportioning Valve is the latest in a wide selection of Air-Gas Mixers, L-P Proportional Mixers and Diluter Valves. This new Consta-Valve is finding wide application among industrial gas users, due to its modern design, simplicity, durable construction and many proven performance features.

Minute Adjustment of Air-Gas Mixtures Because of the increasing need today for extreme accuracy of air-gas mixtures, this machine incorporates regulating features that will enable minute adjustment of the mixture at any point in the entire range of valve capacity. It also makes provision for the overall BTU change that is required from time to time on special applications. Mixture ratio is independent of fluctuations in gas pressure or changes in output demand.

Easily Handles All Requirements Whether the air-gas mixture requirement is for an exothermic or endothermic generator, or a full pre-mix requirement for burner applications, it will be handled equally well by the McKee Consta-Mix Proportioning Valve, which is designed to be used with manufactured, natural, or liquefied petroleum gases mixed with air in any predetermined proportion.

Wide Range of Applications Within the valve capacity range specified as standard, this unit can handle brazing, soldering operations, flame hardening, small furnace heat or atmosphere gas generating with this single valve, by air-gas regulation for the particular requirements. No special parts or intricate regulations are required. Also suitable for L-P Gas standby.

Available in capacity range up to 6000 CFH mixture. Can be furnished with or without booster. Y5150

For further details,

Write for Bulletin. L-600

Representatives in all principal cities.

Eclipse Fuel Engineering Company
725-6 South Main Street, Rockford, Illinois

McKee Eclipse

Foundry STATISTICS

Ingot Brass and Bronze

(Shipments in net tons)

	1949	1950
Jan.	19,456	18,874
Feb.	15,026	18,487
Mar.	14,550	22,494
Apr.	10,695	.....
May	11,114	.....
June	9,696	.....
July	10,220	.....
Aug.	14,194	.....

Source: Ingot Brass and Bronze Industry.

Foundry Production Workers

ESTIMATED NUMBER

Type Foundry	Jan. 1950	Dec. 1949	Jan. 1949
Iron & Steel	172,200	172,100	225,800
Nonferrous	65,900	65,900	72,000

AVERAGE WEEKLY EARNINGS

Gray Iron	$57.86	$57.29	$57.58
Malleable Iron	59.29	57.41	58.94
Steel	58.71	56.61	60.39
Nonferrous	62.77	63.24	61.46

AVERAGE WEEKLY HOURS

Gray Iron	39.2	39.0	39.6
Malleable Iron	38.3	37.4	38.7
Steel	38.0	37.0	39.6
Nonferrous	39.7	39.9	39.4

LABOR TURNOVER RATE (JAN.)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	5.0	4.0	0.8	2.8
Malleable Iron	4.5	2.7	0.8	1.6
Steel	4.0	2.2	0.6	1.3

Source: Bureau of Labor Statistics.

Index of Foundry Equipment Orders

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1949	1950
Jan.	149.9	159.3
Feb.	144.4	113.1
Mar.	190.8	225.2
Apr.	172.0	....
May	121.9	....
June	164.9	....
July	146.6	....
Aug.	127.1	....
Sept.	166.6	....
Oct.	133.5	....
Nov.	270.4	....
Dec.	201.0	....

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Shipments of Castings

(Reported by Bureau of the Census)

Gray Iron

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1948			
Total	12,785,909	7,131,405	.....
1949			
Jan.	1,040,343	573,511	2,064,861
Feb.	986,591	535,163	1,857,403
Mar.	1,074,704	567,041	1,639,465
Apr.	929,307	467,433	1,445,532
May	866,631	439,420	1,243,266
June	905,573	455,442	1,086,989
July	696,915	341,657	1,031,963
Aug.	872,013	445,981	1,048,308
Sept.	880,647	459,014	980,070
Oct.	715,685	397,939	955,100
Nov.	718,703	395,107	938,629
Dec.	862,172	440,409	892,458
Total	10,549,284	5,517,527	.....
1950			
Jan.	913,321	449,577	914,185
Feb.	864,189	416,594	873,455

Copper-base Alloys

(Thousands of pounds)

	Shipments Total	Sand	Perm. Mold	Unfilled *Orders
1948				
Total	1,030,825	930,790	59,009	.....
1949				
Jan.	76,348	68,379	4,593	48,124
Feb.	68,776	61,278	3,951	40,517
Mar.	70,173	62,557	3,927	37,646
Apr.	59,573	52,837	3,458	32,746
May	53,699	48,004	2,830	30,926
June	52,616	47,678	2,552	26,786
July	43,273	39,372	2,129	26,013
Aug.	58,055	53,203	2,929	26,071
Sept.	60,771	55,221	2,729	26,527
Oct.	58,249	52,861	2,316	23,634
Nov.	61,818	56,669	2,811	23,625
Dec.	63,873	58,291	3,086	23,435
Total	725,318	654,444	37,311	.....
1950				
Jan.	65,585	58,878	3,440	25,216
Feb.	67,029	60,257	3,626	26,923

Steel

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1948			
Total	1,760,032	1,335,295	.....
1949			
Jan.	140,577	103,503	338,889
Feb.	135,042	99,425	320,202
Mar.	138,889	102,027	284,754
Apr.	119,953	83,277	250,506
May	106,178	75,537	191,473
June	116,052	84,112	173,237
July	78,710	50,124	155,494
Aug.	89,964	59,412	143,566
Sept.	86,502	55,853	127,664
Oct.	70,690	48,263	124,817
Nov.	76,437	50,685	117,865
Dec.	84,508	53,079	122,887
Total	1,243,502	865,297	.....
1950			
Jan.	88,821	57,996	142,484
Feb.	91,827	62,045	165,186

Magnesium

(Thousands of pounds)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1948			
Total	8,214	7,488	....
1949			
Jan.	822	761	3,821
Feb.	813	756	3,586
Mar.	879	800	3,227
Apr.	726	669	3,234
May	778	726	2,885
June	799	759	3,025
July	689	637	3,073
Aug.	753	712	3,107
Sept.	727	691	3,015
Oct.	796	763	3,050
Nov.	801	769	2,399
Dec.	781	738	2,216
Total	9,364	8,781	....
1950			
Jan.	814	762	2,237
Feb.	735	676	2,218

* For sale only.

Malleable

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1948			
Total	933,265	525,212	.....
1949			
Jan.	71,876	38,040	126,393
Feb.	66,744	35,074	118,318
Mar.	72,052	38,143	102,379
Apr.	61,329	31,728	94,958
May	54,572	27,643	78,944
June	59,597	32,639	69,865
July	44,360	23,216	70,796
Aug.	58,121	30,327	61,330
Sept.	60,488	30,646	57,512
Oct.	57,150	28,582	54,322
Nov.	49,439	25,250	55,795
Dec.	57,379	29,679	60,835
Total	713,107	370,967	.....
1950			
Jan.	62,874	32,918	62,307
Feb.	60,386	31,249	67,049

Aluminum

(Thousands of pounds)

	Shipments Total	Sand	Perm. Mold	Die	Unfilled *Orders
1948					
Total	424,490	139,781	161,334	118,738	.....
1949					
Jan.	29,142	9,702	10,386	8,490	55,580
Feb.	27,228	9,286	9,339	7,795	52,916
Mar.	27,478	9,348	9,386	7,999	50,508
Apr.	23,801	8,041	8,353	6,876	45,638
May	21,392	7,582	7,293	5,994	41,460
June	23,261	8,668	7,790	6,257	38,159
July	18,621	6,311	6,592	5,180	36,993
Aug.	23,997	9,048	8,326	6,119	38,130
Sept.	27,546	9,923	9,491	7,623	38,179
Oct.	29,071	9,634	9,923	8,908	37,881
Nov.	26,317	9,212	8,315	8,348	36,846
Dec.	26,762	10,070	7,714	8,430	36,921
Total	304,616	106,825	102,908	88,019	.....
1950					
Jan.	28,801	9,646	9,400	9,052	40,591
Feb.	28,887	10,171	9,358	8,851	44,235

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It Cuts . . . It Smooths . . .

You'll find this new Norton wheel ideal for use on your portable grinders and sanders for cutting down and smoothing up surface irregularities on large castings, such as mold marks and fins. It cuts fast and clean without spalling or loading—often outlasts wheels of a similar type by two to three times—and reduces operator fatigue because of its light weight and easy handling.

It Notches Gates and Risers . . .

You'll find you can save money with this versatile new wheel also by using it to notch large gates and risers prior to breaking them off with a sledge. This method has eliminated slower, more expensive flame cutting and sawing methods in many foundries. And you can use the NORTON REINFORCED Hub Wheel for this operation with complete safety, for its unique fabric layer construction and safety web back prevent it from flying apart even if accidental breakage should occur during use.

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Activities of Foundry GROUPS

Southern California

ALUMINUM Alloy Castings" was the title of the talk by R. A. Quadt, Federated Metals Division, American Smelting & Refining Co., at the Mar. 10 meeting of the Southern California Chapter of AFS.

Using slides Mr. Quadt illustrated several casting defects, thoroughly explaining causes and corrections.

Following the talk the motion picture "Behavior of Molding Sands at Elevated Temperatures" was shown through courtesy of the Harry W. Dietert Co., Detroit.

A large attendance was present at the Apr. 14 meeting of the Southern California Chapter of AFS held at the Rodger Young Auditorium, Los Angeles, to hear a talk by L. P. Robinson, Werner G. Smith Co., Cleveland. His topic was "Cutting Costs in the Coreroom."

In analyzing these costs Mr. Robinson declared: Core blowing reduces time to make cores and also produces a uniform product but a reasonably long run should be assured to warrant the cost of rigging; good cores, to be made economically, should be made by accurately measuring the core mixture in pounds; a good core sand mixture can reduce and maintain a lower average weight per casting; use only sufficient cereal binder to provide proper green strength; get the proper type of sand and stay with it; have a dependable employee mix the core sand; control oven temperature; inspect all cores—in case of doubt, junk the core.

Preceding dinner, the three motion pictures on gating systems produced by the Naval Research Laboratory, Washington, were shown. Chapter President Earle Shomaker, Kay-Brunner Steel Products Co., Alhambra, Calif., presented a trophy to the West Coast Foundry & Mfg. Co. team, winner of the chapter's 1949-50 bowling tournament. Oliver Greeley, team captain, accepted the award in behalf of the team.

The following were nominated to serve as chapter officers for the coming year: John Wilson, Climax Molybdenum Co., president; Henry W. Howell, Howell Foundry Co., Los Nietos, Calif., vice president; Harold Pagenkopp, Angeles Pattern Works, Huntington Park, Calif., for re-election as secretary; and A. L. Goodreau, G-B Brass & Aluminum Foundry Co., Los Angeles, as treasurer.—*W. G. Stenberg, U. S. Electrical Motors Inc.*

Twin City

OFFICERS and directors for 1950-51 were elected at the Apr. 11 meeting of Twin City Chapter of the AFS held at the Covered Wagon, Minneapolis. S. L. Cameron Jr., vice president, Valley Iron Works Inc., St. Paul, was elected chairman; C. F. Quest, vice president, J. F. Quest Foundry Co., Minneapolis, was elected vice chairman and Lillian K. Polzin, director of the Manufacturers' Secretariat, Minneapolis Chamber of Commerce, was re-elected secretary-treasurer.

Directors elected to serve three years are: Arthur W. Johnson, Northern Malleable Iron Co., St. Paul; Nathan Levinsohn, Minneapolis-Moline Co., Minneapolis; and O. J. Myers, Werner G. Smith Co. Charles F. Kausel, Kausel Foundry Co., Minneapolis, was re-elected to serve as director for one year.

The 100 members and guests pres-

(*Continued on page* 173)

SOUTHERN CALIFORNIA Chapter of the AFS met at Rodger Young Auditorium, Los Angeles, Apr. 14. Shown at the speakers' table, left to right, are: Emil Pesche, chapter house committee chairman; Henry Howell, Howell Foundry Co., Los Nietos, Calif., chapter treasurer; Earl Anderson, past chapter president; Robert Gregg, Reliance Regulator Corp., Alhambra, Calif., national AFS director; John E. Wilson, Climax Molybdenum Co., Los Angeles, chapter vice president; L. P. Robinson, Werner G. Smith Co., speaker of the evening; Earl Shomaker, Kay-Brunner Steel Products Co., Alhambra, chapter president; Harold Pagenkopp, Angelus Pattern Works, Huntington Park, Calif., chapter secretary, and Leonard Hofstetter, Brumley-Donaldson Co., Los Angeles, past chapter president

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Because these photographs show the modern way with light metal castings. Here you see a booked type core box with an irregular parting and a white metal drier pattern for a manifold. The core box is about 22½ x 8½ x 5⅛ inches, weighs 37½ lbs. and costs $95.95. The white metal drier weighs 25 lbs. and costs $80.00.

Core dummy in follow board, skeleton frames for core box and drier ribbing were furnished as shown.

Hand or disc grinder finish is sufficient on faces of pressure cast core boxes, but they may be machined without fear of porosity.

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TRI-STATE Chapter of the AFS met Mar. 17 at Coffeyville, Kans. Shown at the meeting, left to right, are: R. G. McElwee, Vanadium Corp. of America, Detroit; Dan Mitchell, Progressive Brass Mfg. Co., Tulsa, Okla., chapter secretary, and R. Gilmore, Gilmore Pattern Co., Tulsa

(*Continued from page* 170)

ent received a great deal of information from the AFS research film, "Fluid Flow in Transparent Molds." Another motion picture, entitled "Fishing in Alaska," was shown through the courtesy of Nash Motors Co.

Retiring Chairman Frank Austin, Crown Iron Works Co., was offered a vote of thanks in the form of tumultuous applause.—*J. D. Johnson, Werner G. Smith Co.*

Tennessee

THE movie, "Chaplets and Chills," made by Fanner Mfg. Co., Cleveland, was shown at the Mar. 24 meeting of the Tennessee Chapter of AFS at Hotel Patten, Chattanooga. Fifty members and guests were present. Chairman Karl Landgrebe, the Wheland Co., Chattanooga, who presided, named a nominating committee to select officers and directors for the coming season.—*Carl A. Fischer Jr., Fischer Supply Co.*

Central New York

APRIL meeting of Central New York Chapter of the AFS was held at Cornell University, Apr. 14. George Dreher, managing director, Foundry Educational Foundation, briefly described the work accomplished by the foundation and outlined what to expect in the near future. He was followed by Prof. Peter E. Kyle, who discussed Cornell University's part in the foundation program and stated that 20 students were participating. He then introduced two scholarship students, N. Sheptak and R. L. Folkman, who discussed their introduction to the foundry industry. During the 9-week working period both students had helped the regular foundry personnel solve a particular problem, thus benefiting materially the co-operating foundries and themselves.

Chapter Chairman J. F. Livingston, Crouse-Hinds Co., Syracuse, then introduced the meeting's principal speaker, William M. Ball Jr., metallurgical and foundry consultant, R. Lavin & Sons Inc., whose subject was "Nonferrous Castings."

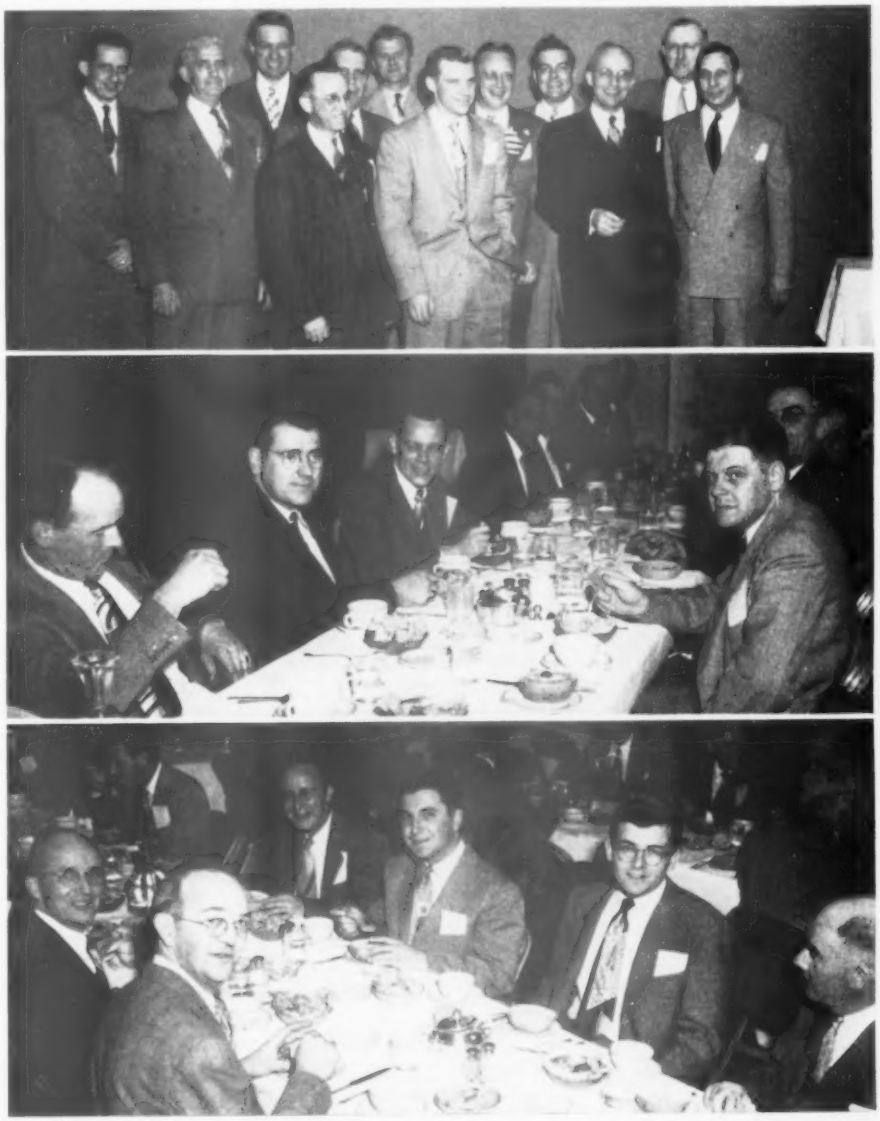
Mr. Ball introduced his talk by pointing out that it is possible to produce good castings without all the "super-duper" ideas sometimes considered necessary. In many cases a thorough check of facilities at hand is all that is required. To prove his statement, Mr. Ball, using a drawing board, followed a casting through the core department, foundry and cleaning room, citing examples at each step to show how good control and a little common sense could prevent many difficulties from occurring.—*J. A. Feola, Crouse-Hinds Co.*

Tri-State

TRI-STATE Chapter of the AFS met in Coffeyville, Kans., Mar. 17. The speaker was R. G. McElwee, Vanadium Corp. of America, Detroit, and his subject was "Research as Applied to the Foundry." Mr. McElwee pointed out the necessity of having skilled personnel to cope with the high cost of manufacture and the rigid specifications required by the foundry.

Chairman C. A. McNamara, Big 4 Foundry Co., Tulsa, Okla, presided and appointed a nominating commit-

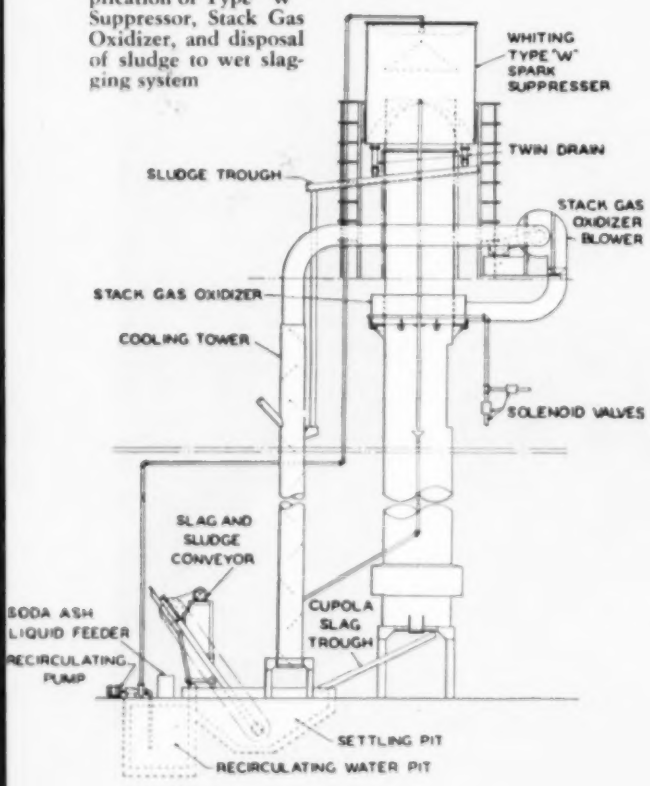
(*Continued on page* 176)

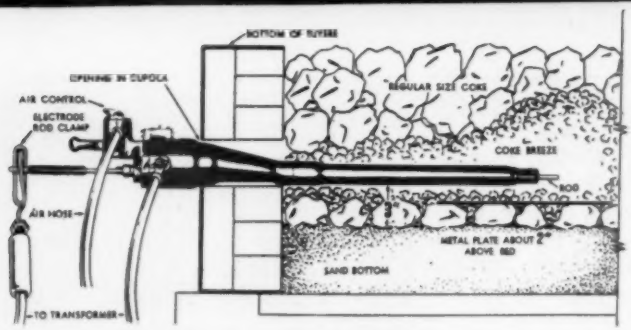


TENNESSEE Chapter of the AFS met at Hotel Patten, Chattanooga, Tenn., Mar. 24. Views of some of those attending the meeting are shown above

Whiting Type "W" Hydro-Clone Dust and Spark Suppressors, complete with Stack Gas Oxidizers, on two #9 Cupolas

Diagram showing application of Type "W" Suppressor, Stack Gas Oxidizer, and disposal of sludge to wet slagging system





Whiting-Mason Electric Coke Igniter

HYDRO-CLONE

WET SUPPRESSION

controls the smoke, fumes and fly ash from cupola operations

For several years, Whiting engineers have devoted major attention to the foundry's greatest problem—dust. They have achieved their goal and we now offer dust suppression equipment which the ordinary foundry can afford.

In the case of cupola smoke and fumes, the principal causes and most effective corrective measures are these:

1. Cinders, sparks, and fly ash—greatly aggravated by today's poor quality coke—are now controlled with Type "W" WHITING HYDRO-CLONES which use water to suppress the escaping solids, reducing them to easily disposable sludge.

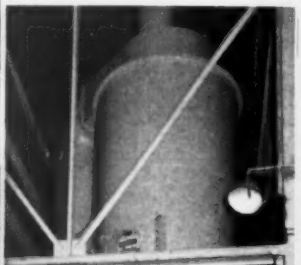
2. CO gas, also greatly aggravated by poor quality coke, is burned to harmless CO_2 with the WHITING STACK GAS OXIDIZER and FLAME SUPPRESSOR. Or in some cases with a WHITING GAS FIRING UNIT installed at the charging door.

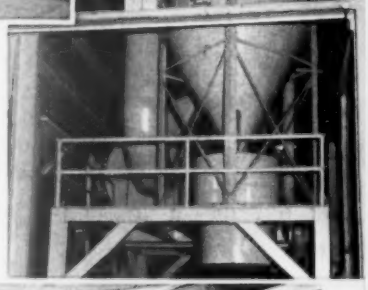
3. Smoke from wood used in ignition. Easily prevented by using the recently developed WHITING-MASON ELECTRIC COKE IGNITER.

If your cupola stack is a neighborhood problem, or if you are faced with rigid local dust-control regulations, Whiting engineers will gladly work with you. In many instances, savings in cost of cleaning roofs and reductions in fire hazards pay a large share of the cost of Hydro-Clone equipment.

Conveyor hood draws off steam and dust from casting conveyor at dumping point

Cope shakeout and louver system at flask breaking





Type "D" Suppressor collects dust from coke, stone, and iron weigh hoppers

HYDRO-CLONE

WET SUPPRESSION

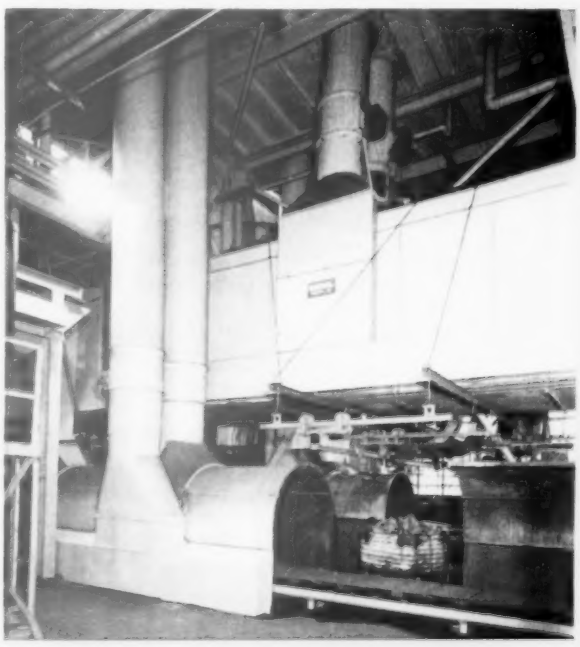
controls dust from sand-handling, shakeouts, and other indoor sources

Whiting Hydro-Clones are used with great effectiveness to suppress foundry dusts at their source. By controlling dusts arising from weigh hoppers, shakeouts, tumbling mills and sand-handling systems, foundry air can be kept clean, which will attract a better class of workers.

Whiting Hydro-Clones for foundry use are available in vertical types to minimize occupancy of floor area, and in horizontal types which are preferred where headroom is at a premium. Both types operate with equal efficiency, suppressing dust with water and reducing it to harmless, easily disposable sludge.

A Whiting representative will gladly analyze your dust control problems and indicate how Hydro-Clones can be used most effectively in solving them. Write for free literature describing Hydro-Clone equipment for the control of foundry dusts.

Type "CH" Hydro-Clone collects dust from shakeout and sand-handling system



Mold conveyor enclosure, exhaust, and return air system which conserves foundry heat

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If cleaning large castings is a *s-l-o-w* process in your plant—*speed up* your cleaning operation with a Pangborn Air Blast Cleaning Room!

Work can be loaded or unloaded from *both* ends and heavy, cumbersome castings are quickly and easily handled with either a car or overhead conveyor. Large castings are cleaned in a jiffy, assuring you a *smooth flow of work* from shakeout, through cleaning and on to grinding and inspection.

Pangborn has *job-proven* Air Blast Room designs to meet all cleaning requirements. Features include plenty of illumination on the work, automatic abrasive recovery which removes sand, refuse and dust *before* returning abrasive for re-use.

For Full Details on Pangborn Air Blast Cleaning Rooms for your plant, write today to: PANGBORN CORPORATION, 2300 Pangborn Blvd., Hagerstown, Maryland.

Look to Pangborn for the Latest Developments in Blast Cleaning and Dust Control Equipment

More than 25,000 Pangborn Machines Serving Industry

Pangborn

BLAST CLEANS CHEAPER with the right equipment for every job

(*Continued from page* 173)

tee to select a slate of officers for the coming year.—*Dale Hall, Oklahoma Steel Castings Co. Inc.*

Ohio State University

GUEST speaker at the Apr. 4 meeting of Ohio State University Student Chapter of the AFS was Wilfred White, metallurgist, Jackson Iron & Steel Co., Jackson, O. His topic was, "The Gray Iron Industry."

Mr. White pointed out that many foundries in business today are in need of systems for controlling operations so that high quality castings can be produced consistently. In some of these foundries operating costs could be reduced considerably through purchase and use of relatively inexpensive laboratory equipment. Existence of such conditions, said Mr. White, presents a challenge to the student members of AFS who will soon be entering the foundry industry.

Each of these foundries represents a potential job opening for the graduating engineer who can present to the foundry operator methods for controlling operations to reduce scrap losses and maintain quality standards. The speaker concluded by stating that drive and application of methods of control in the foundry can help the graduating engineer secure success for himself and for the foundry which employs him.

Chapter member John Matyskella was presented the monthly award for outstanding service to the chapter.—*Dallas M. Marsh*

Philadelphia

SPEAKER at the April meeting of Philadelphia Chapter of the AFS was Max Kuniansky, vice president and general manager, Lynchburg Foundry Co., Lynchburg, Va. Approximately 150 members and guests were present to hear him discuss nodular iron, its manufacture, uses, heat treatment and eccentricities. Mr. Kuniansky also presented an interesting film on operations at the Lynchburg foundry.—*Albert J. Saute, American Engineering Co.*

Chesapeake

FORTY members and guests of Chesapeake Chapter of the AFS met Mar. 24 at the Engineers Club, Baltimore, to hear E. C. Troy, National Engineering Co., Chicago, discuss sand and sand testing.

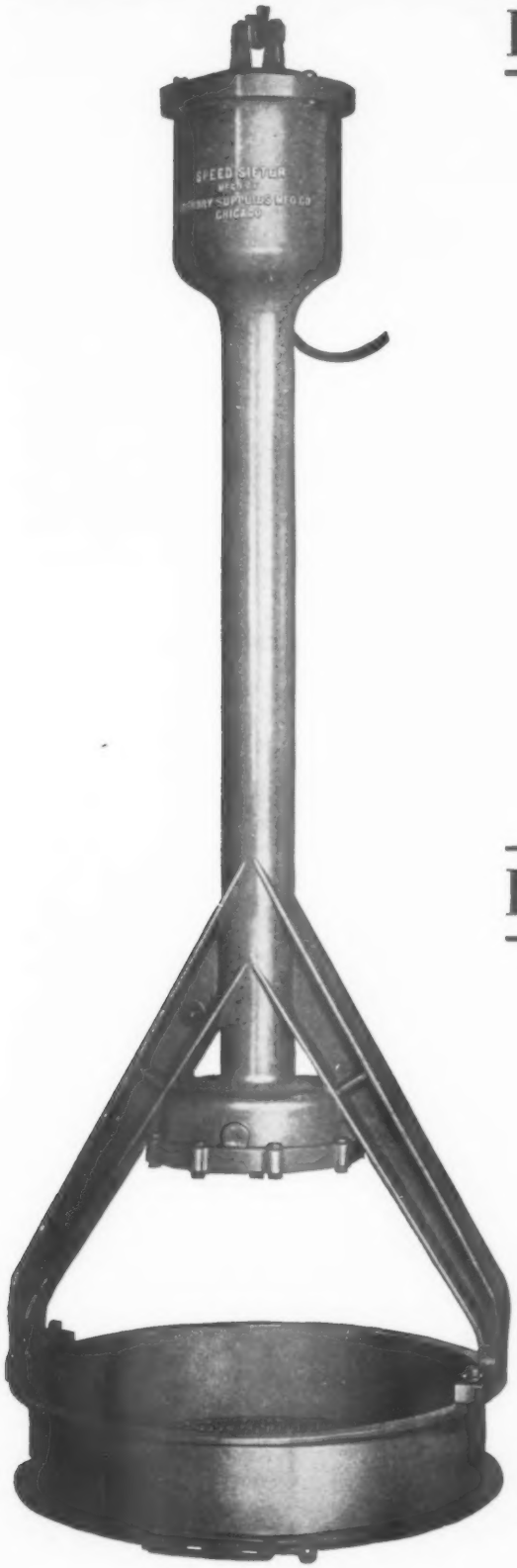
Mr. Troy pointed out the inadequacy of present sand testing methods for determining information the

(*Continued on page* 178)

Increase Production

with the

ROTOPLANE SPEED SIFTER ★ RED ELECTRIC VIBRATORS



ROTOPLANE SPEED SIFTER

The ROTOPLANE Speed Sifter is an *improved* sand riddle of much greater capacity and much longer life. One size and type serves all purposes in the foundry—does *all* your sifting more quickly and economically.

It is easily handled by one man, weighs approx. 90 lbs., is 62 in. high overall. The one-piece frame of tough aluminum alloy makes for a remarkably effective vibration. Its smooth, free, rotary action vastly increases bearing life; all bearings grease packed. All mechanism of the ROTOPLANE is *completely* enclosed—no bearings or activating parts of any kind exposed to dust and grit.

The Quick-Change Sieves are instantly interchangeable, mounted in smooth, flat steel ferrule, with 20-inch diameter clear sifting area. No jagged edges to tear workers' hands, no storage problem.

$245.00 f.o.b. Chicago—complete with cable, safety ground wire. Standard 1/3 h. p. motor, 110 volt, 60 cycle, single phase and 220 volt, 1 or 3 phase.

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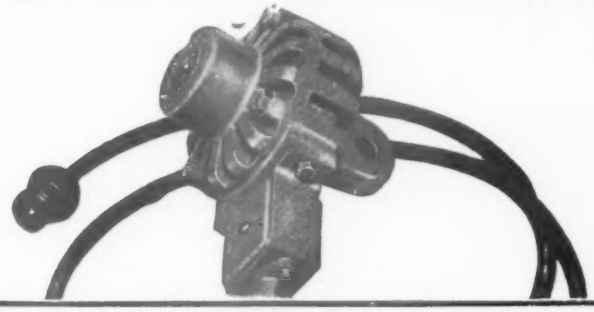

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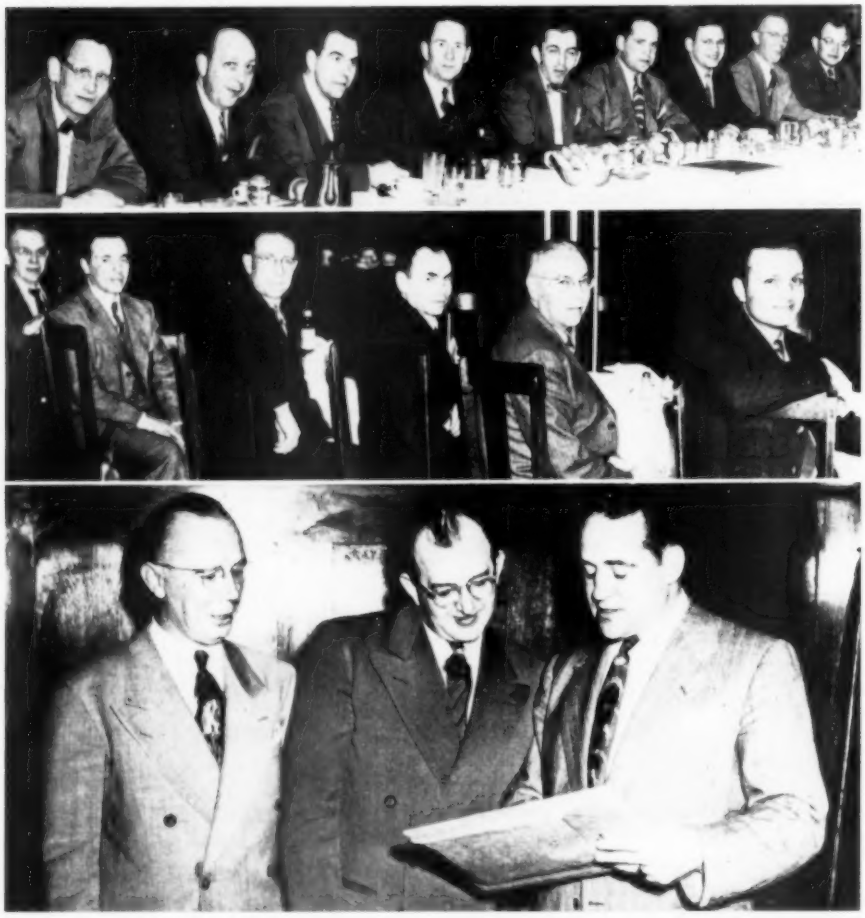
(*Continued from page* 176)
foundryman needs to know. The difficulties experienced with cope fallout indicates the need for a more indicative sand tension test. Thermal conductivity of molding sand mixtures at elevated temperatures also would be a valuable adjunct to present knowledge. — *Jack H. Schaum, National Bureau of Standards*

Central Indiana

A PERENNIAL favorite of members of Central Indiana Chapter of the AFS is the question and answer panel. This was featured at the chapter's Apr. 3 meeting held at the Athenaeum, Indianapolis, with approximately 90 in attendance.

J. P. Lentz, International Harvester Co., Indianapolis, served as chairman of the meeting. The panel of experts included G. C. Dickey, Harrison Steel Castings Co., Attica, Ind.; Fred E. Kurtz, Electric Steel Castings Co., Indianapolis; Harold H. Lurie, Cummins Engine Co., Columbus, Ind.; Minor L. Carpenter, International Harvester Co., Indianapolis; William Zeunick and James Barrett, National Malleable & Steel Castings Co., Indianapolis; Carl O. Schopp, Link-Belt Co., Indianapolis; Paul Lee Hargitt, Light Metals Inc., Indianapolis, and Norman E. Baker, Nonferrous Foundries Inc., Indianapolis. —*W. K. Mitchell.*

SAND SCHOOL: Southern California Chapter of the AFS, through its educational committee, E. K. Smith, chairman, sponsored a "Sand School" at Bowne Hall, University of Southern California, Mar. 13-16. The school was conducted by Harry W. Dietert, Harry W. Dietert Co., Detroit. Chairmen at the four sessions were: Robert Gregg, Reliance Regulator Corp., Alhambra, Calif.; Robert Haley, Advance Aluminum & Brass Co., Los Angeles; W. D. Emmett, Los Angeles Steel Castings Co., Los Angeles, and James Barr, Compton Foundry, Compton, Calif. Shown above, left to right, are: Mr. Dietert, Mr. Smith, and Earle D. Shomaker, Kay-Brunner Steel Products Inc., Alhambra, Calif., chapter chairman



CENTRAL INDIANA Chapter of the AFS met at the Atheneaum, Indianapolis, Mar. 6. View of speakers' table is shown at top. Middle view shows six men from Decatur Castings Co., Decatur, Ind., who drove 120 miles to attend the meeting. At bottom, left to right, are: S. T. Martin, production manager, Central Foundry Division, General Motors Corp., Danville, Ill., speaker; Russell Bandy, assistant chief, methods and rates department, International Harvester Co., Indianapolis, technical chairman, and E. E. Braun, plant manager, Central Foundry Division, speaker. Photos by International Harvester Co.

Michigan State

INSTALLATION meeting of the Michigan State Student Chapter of AFS was held on the university campus Apr. 11. AFS national director Frank Reicks, manager of foundries, Ford Motor Co., presented the principal address of the meeting. His topic was, "Opportunities in the Foundry Industry." Edward H. Fauth is chairman of the new chapter.

Quad City

NODULAR iron, a magnetic subject for foundrymen, proved its drawing power by filling the Fort Armstrong Hotel ballroom when Quad City Chapter of the AFS met there Apr. 17. M. E. Brooks, foundry engineer with Dow Chemical Co., Bay City, Mich., was the speaker.

Mr. Brooks pointed out that a cupola can be used for melting iron, but to do so, one must have a knowledge of the reaction and good control in melting. Nodular iron has good fluidity but requires gating designed for its greater shrinkage. Exceptional properties are obtained in the as-cast condition; however, most foundries are using a short anneal. When annealed for two hours, a tensile strength of 60,000 psi with 10

(*Continued on page* 180)

REDUCE Rejects... Parting Troubles... Foundry Smoke

USE **"dag"** colloidal graphite dispersions for permanent molds and die casting. Easily applied by brush or spray, they prevent adhesion of cast objects to molds, patterns, cores, ladle interiors and chills.

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(*Continued from page* 178)

to 15 per cent elongation can be expected. Nodular iron offers good properties for shock and high temperatures.—*R. E. Miller, John Deere Planter Works*

Wisconsin

SECTIONAL meetings were again featured at the Apr. 14 meeting of Wisconsin Chapter of the AFS held at Hotel Schroeder, Milwaukee.

President Robert Woodward, Bucyrus-Erie Co., South Milwaukee, Wis., announced the election of the following officers for 1950-51: President, Walter W. Edens, works manager, Badger Brass & Aluminum Foundry Co.; vice president, George E. Tisdale, secretary and treasurer, Zenith Foundry Co.; treasurer, L. H. Decker, Allis-Chalmer Mfg. Co.; secretary, J. G. Risney, president, Risney Foundry Equipment Co. Directors elected to serve three years include: E. C. Meagher, Federal Foundry Supply Co.; M. C. Frankard, Delta Mfg. Co., and H. A. Ziebell, Crucible Steel Casting Co.

The chapter members then divided into five discussion groups. The steel group had as its chairman, Eugene Schneider, Grede Foundries Inc., with Oscar H. Kraft, Bucyrus Erie Co. as co-chairman. The speaker was J. B. Caine, foundry consultant, Wyoming, O., who discussed "Sand in the Mill vs. Sand in the Mold."

Members interested in gray iron heard Victor Rowell, Trabon Co., Chicago, whose subject was "Coremaking and Its Influence on Casting Defects." G. P. Antonic, Walter Gerlinger Inc., Milwaukee, was chairman, and Leslie Woehlke, Grede Foundries Inc., was co-chairman.

The malleable and technical groups heard a talk on "The Effects of Deoxidizing Additions on Foundry Mal-

(*Continued on page* 182)

WISCONSIN Chapter of the AFS held sectional technical sessions and its annual election of officers and directors at the April meeting. Photos are by Walter V. Napp, Badger Firebrick & Supply Co.

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EXCLUSIVE TWO-PIECE CONSTRUCTION . . . THICKER AND WIDER BEARING BAR
EXCLUSIVE DOUBLE WELDING, ON EACH SIDE, AVOIDS WARP . . . DISTRIBUTES LOAD

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Other reliable BS&B all-steel foundry necessities . . . bottom boards and core plates. Ask about them!

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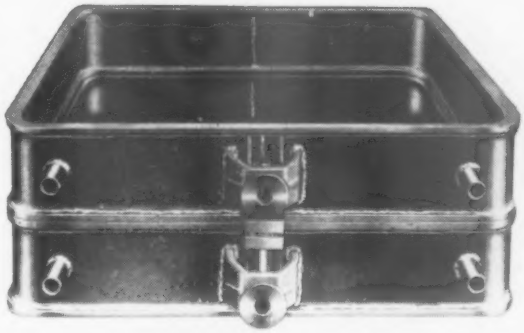

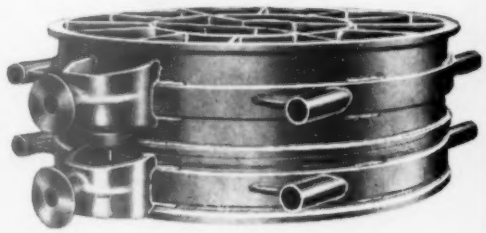

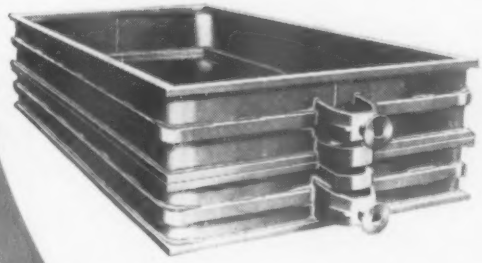

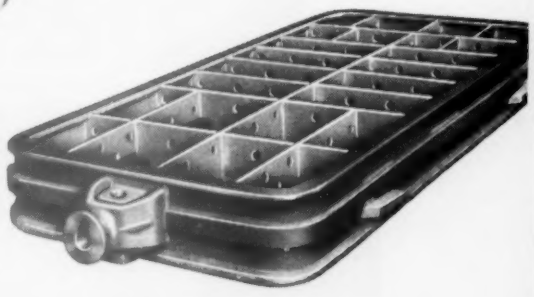

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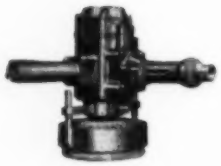

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(*Continued from page* 180)

leable Irons," by R. W. Heine, University of Wisconsin, with Roy MacIntosh and H. C. Stone, both of Belle City Malleable Iron Co., as chairman and co-chairman, respectively.

Speaker at the nonferrous session was Harold E. Younger, Chicago Faucet Co., Chicago, and his talk was entitled "General Foundry Practice for Producing Quality Castings." John L. Kammermeyer, Federated Metals Division, was chairman and Casimer Kotowicz, Ampco Metals Inc., co-chairman.

A sound movie, "History of Aluminum as Now Used in Patterns and Castings," was presented by J. R. Patterson, Aluminum Co. of America, to the pattern group. Walter Kollmorgen, Kollmorgen Pattern Works, served as chairman.

The chapter has scheduled its annual Old Timers and Apprentices dinner party for June 13.—*John E. Hubel.*

Northeastern Ohio

APPROXIMATELY 275 members and guests attended the meeting of Northeastern Ohio of the AFS at Tudor Arms Hotel, April 13. Guests included a group of local apprentices who had taken part in the recent molding and patternmaking contest sponsored by the Associated Industries of Cleveland. Fred J. Pfarr, chapter vice president, presented checks to the prize-winning boys in the casting division. Peter Rettig, chairman of chapter's pattern group made the presentation to the boys in the patternmaking division.

Following a brief address by W. W. Maloney, AFS secretary treasurer, the audience was divided into three sections to hear discussions on core blowing, refractories and patternmaking.

The description of core blowing was presented by Z. Madacey, foundry superintendent, Caterpillar Tractor Co., Peoria, Ill. According to the speaker, successful practice depends upon several major factors including accurate sand control.

Sands with a moisture content less than 1.8 per cent are considered dry and detrimental to both cores and equipment. Cores made of wet sand will not hold shape and size. Sand will adhere to the corebox since the moisture acts as a binder. Oil in the first spray entering the corebox oxidizes rapidly and wedges in the vents, between loose pieces and between the joints of the driers.

Moisture readings above 1.8 per cent for small corebox sand, and above 2.10 per cent for large corebox sand

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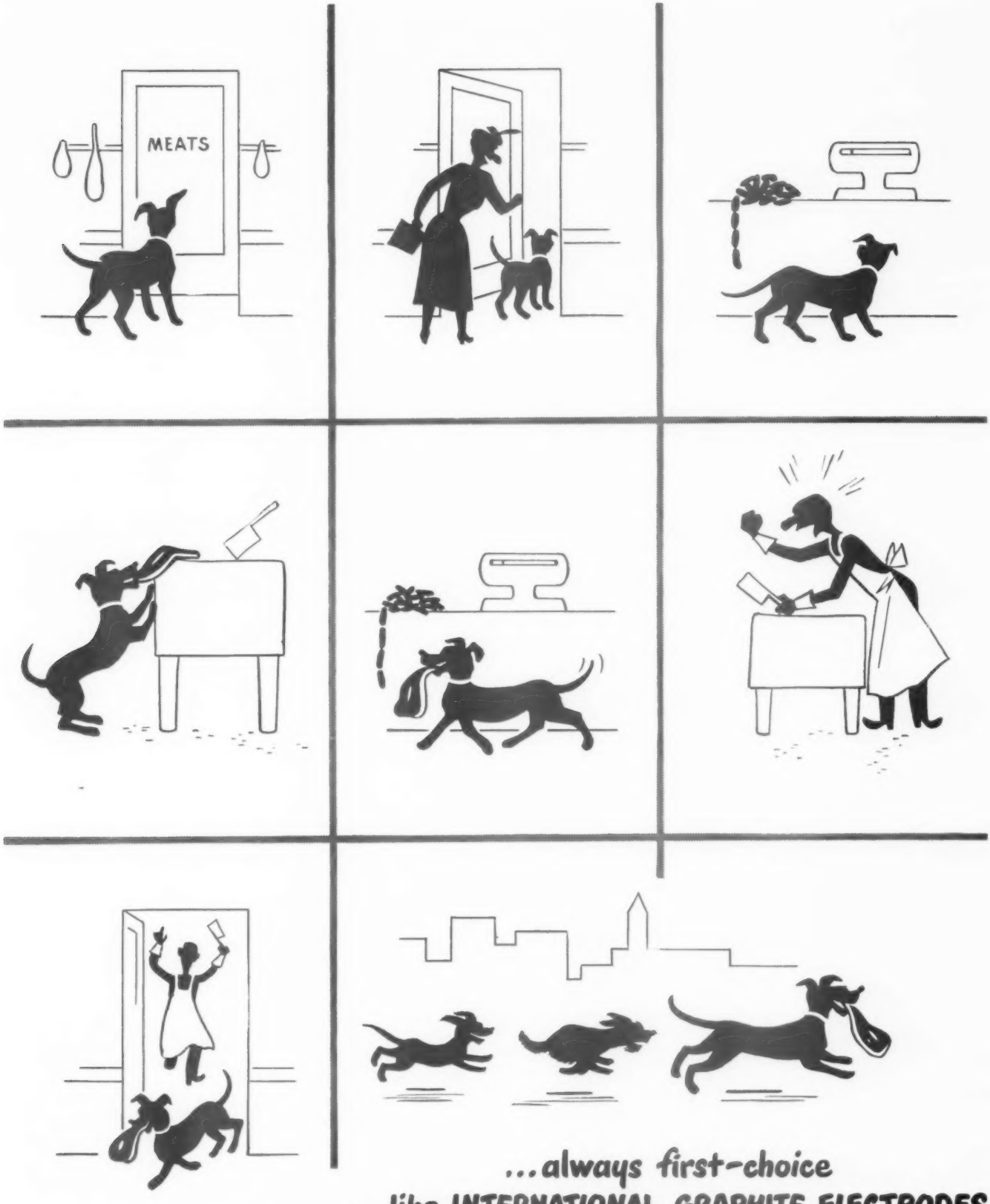

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(*Continued from page* 182)

are considered wet. Typical mixture for manifolds, cylinder head jackets, valves and miscellaneous cores includes 50 gallons silica sand, 30 gallons lake sand, 20 gallons bank sand and 7 quarts oil. This is 1 part oil to 58 parts sand by volume. The presentation was illustrated with slides.

Approximately 50 members attended the session on refractories under the direction of John Manos, Lake City Malleable Co., Cleveland. First speaker, E. C. Petry, North American Refractories Co., Cleveland, discussed refractories for malleable furnaces and pointed out that roof or bungs, side walls, bottoms, and bridges serving under different conditions require refractories of different characteristics. For example, the bung brick should have high spalling resistance, the side wall brick should possess slag resistance, and the bottom brick must be resistant to metal penetration.

Second speaker, S. M. Swain, North American Refractories Co., dealt with cupola refractories. Those, he said, operate under constantly changing conditions including high temperature, complex slag, etc. Spalling condition, he believed, always was present. He pointed out that refractories suitable for operation in one foundry might not do as well in another, or even in different cupolas in the same foundry, and hence from time to time it is well to study the situation to determine whether refractory change is indicated.

At the pattermaking session a panel of experts including Ed Glosner, Modern Pattern Co., chairman; Albert Trhlik, John W. Wilbur Co.; Louis Schmidt, Aluminum Co. of America; Ed W. Pierie, Motor Pattern Co., and Charles Wilburscheid, Master Pattern Co., all of Cleveland, discussed patternmaking questions which had been submitted by a number of apprentices. A number of apprentices were present to participate in the discussion.—*Pat Dwyer, Edwin Bremer, and Robert H. Herrmann.*

MICHIANA Chapter of the AFS announced results of its election at its April meeting. Shown above, left to right, are Stanley F. Krzeszewski, American Wheelabrator & Equipment Corp., Mishawaka, Ind., vice chairman-elect; V. S. Spears, American Wheelabrator & Equipmnt Co., chairman 1949-50; William Romanoff, H. Kramer & Co., Chicago, guest speaker at the meeting; William F. Lange Jr., Casting Service Corp., La Porte, Ind., director, and William Ferrell, Auto Specialties Mfg. Co., St. Joseph, Mich., chairman-elect

NORTHEASTERN OHIO Chapter of the AFS met at Tudor Arms Hotel, Cleveland Apr. 13. Photos are by courtesy of Sterling N. Farmer, Sand Products Corp.

Michiana

PLANNED to appeal particularly to brass and bronze foundrymen, April meeting of Michiana Chapter of the AFS featured William Romanoff, vice president and technical superintendent, H. Kramer & Co., Chicago. His subject was "Brass and Bronze Foundry Practice."

Mr. Romanoff pointed out some of the troubles encountered in brass and bronze founding and suggested various remedies. High strength brasses and bronzes were discussed.

The following chapter officers were elected to serve during 1950-51: Chairman, William Ferrell, Auto Specialties Mfg. Co., St. Joseph, Mich.; vice chairman, Stanley Krzeszewski, American Wheelabrator & Equipment Corp., Mishawaka, Ind.; secretary-treasurer, V. C. Bruce, Frederic B. Stevens Inc. Directors elected to serve three years: Matthew Goodall, Dodge Mfg. Corp., Mishawaka; Roy A. Payne, Sterling Brass Foundry, Elkhart, Ind.; Kent Wonnell, Peru Foundry Co., Peru, Ind.; Leslie Pugh, Casting Service Corp., LaPorte, Ind.

Chairman Verne Spears, American Wheelabrator & Equipment Corp., Mishawaka, announced that a meeting has been held with Central Indiana Chapter of the AFS and faculty members of Purdue University to plan the "Metals Casting Conference for 1950." The dates Nov. 2-3, 1950, have been set and the conference is to be sponsored by Purdue University with the co-operation

(*Continued on page* 186)

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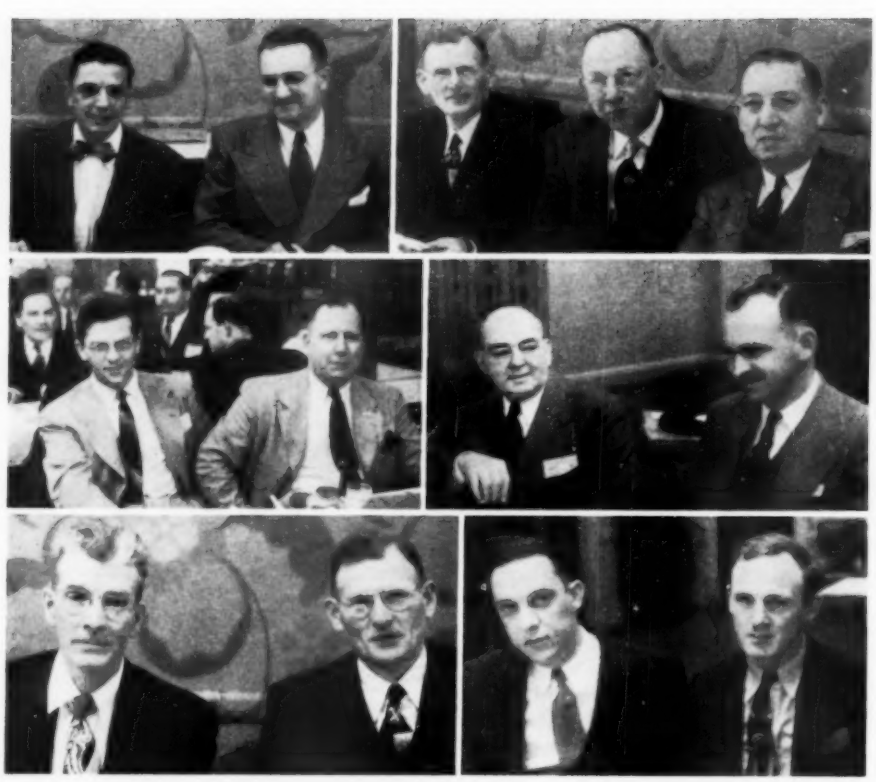

NORTHWESTERN PENNSYLVANIA Chapter of the AFS met Mar. 27. Views of the meeting shown here are by Sterling N. Farmer, Sand Products Corp.

OPEN HOUSE: Members and guests of Birmingham District Chapter of the AFS attended an open-house program at University of Alabama Engineering School, Mar. 24. During the evening the group met at the Tutwiler Hotel, Birmingham, for a dinner meeting. At upper right Ray Farabee, Central Foundry Co., Holt, Ala. (right) is shown chatting with Dean and Mrs. J. R. Cudworth, University of Alabama, during the open house. A "Sand School" was held at the university Mar. 22-24. At lower left, left to right, are: Warren Jeffery, university foundry instructor; Frank Brewster, Harry W. Dietert Co., Detroit, instructor for the "Sand School," and Prof. E. C. Wright, head of the metallurgical engineering department

(*Continued from page* 184)

of the Central Indiana and Michiana Chapters.—*J. P. Jordan, Dodge Mfg. Corp.*

Northwestern Pennsylvania

TWO meetings were held during March by the Northwestern Pennsylvania Chapter of AFS. The first was at Dunkirk, N. Y. on Mar. 17 when Dr. Solomon Simonson, professor of speech at Fredonia State College, Fredonia, N. Y. spoke on "Human Relations." In addition the 75 members and guests present were treated to music by the brass trio of the college and an illustrated talk on a trip to the valleys deep in the Himalaya Mountains between Tibet and India which was presented by Howard S. Weaver.

Mr. Weaver was one of two graduates selected by the National Geographic Society and the Smithsonian Institute to make this trip and gather specimens of birds from that part of the world. Mark Morrison, United States Radiator Co., Dunkirk, was chairman of the meeting which was held at Van Buren Inn, Van Buren, N. Y.

On Mar. 27, the chapter held its regular meeting at the Moose Club in Erie with Frank Volgstadt, Griswold Mfg. Co., Erie, and vice president of the chapter presiding. Harry Kessler, manager of foundry operations, Sorbo-Mat Process Engineers, St. Louis, was the speaker and his subject "Gates and Risers." He outlined a formula for figuring risers on various sized castings which created a most interesting discussion period. Fred J. Eisert, Urick Foundry Co., Erie, served as discussion leader. Roger Griswold, educational chairman, reported progress in the chapter's program of installing a foundry class in the Veteran's school in Erie. —*Earl M. Strick, Erie Malleable Iron Co.*

Birmingham

OFFICERS for the coming chapter year were elected at the Apr. 21 meeting of the Birmingham District Chapter of AFS. Morris L. Hawkins, superintendent of foundries, Stockham Valves & Fittings, Birmingham, was named to succeed C. P. Caldwell, who presided at the meeting. Charles K. Donoho, American Cast Iron Pipe Co., was elected vice chairman and Fred K. Brown, Adams-Rowe & Norman, was re-elected secretary-treasurer.

New directors, elected for three-year terms are: C. P. Caldwell, Cald-

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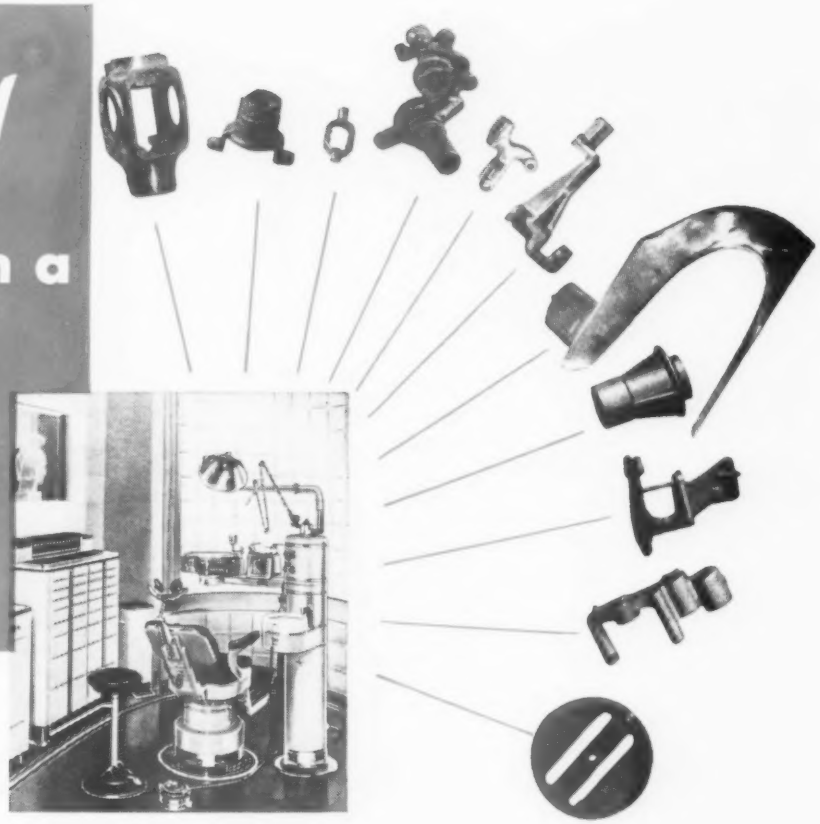
HOW MANY CASTINGS in a DENTIST'S EQUIPMENT?



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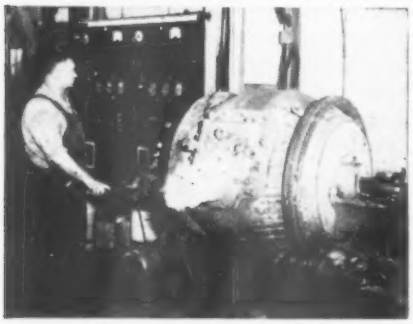

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Reports from the FOUNDRY FRONT

The following excerpts from reports on "T" Shot and Grit which have been received since its introduction less than four months ago:

- ✓ ***Gray Iron Foundry Reports:*** 47.7% less abrasive used per load of castings cleaned.
- ✓ ***Malleable Iron Foundry Reports:*** 32.7% lower abrasive and maintenance costs per ton of castings cleaned.
- ✓ ***Steel Foundry Reports:*** 24.9% reduction in abrasive costs alone.

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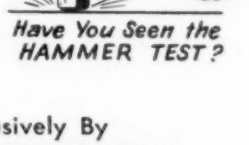

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(*Continued from page* 186)

well Foundry & Machine Co., Birmingham; Ray L. Farabee, Central Foundry Co., Holt, Ala.; R. L. Jackson, Production Foundries Division, Jackson Industries Inc., Birmingham; M. W. White, Alabama Clay Products Co.; and Donald C. Abbott, Hill & Griffith Co., who was re-elected for a three-year term as director.

"Magnesium-Containing Cast Irons" was discussed by R. J. Rice, research division, International Nickel Co., Houston, Tex., during the technical meeting. His talk was illustrated with slides to emphasize the results outlined.

Warren Jeffry, head of the University of Alabama's foundry department, announced that 16 students had already paid their dues and the group has made application for membership as an AFS student chapter.—*J. P. McClendon, Stockham Valves & Fittings*

Canton

NEW officers and directors of Canton District Chapter of AFS were installed at the group's final dinner meeting Apr. 6. Thomas W. Harvey, Pittsburgh Valve & Fitting Div., Pitcairn Co., Barberton, O., was elected chairman with C. B. Williams, Massillon Steel Casting Co., Massillon, O., as vice chairman; Dale Crumely, Barberton division of the Pitcairn Co. as secretary; and Fred Basler, A. P. Green Fire Brick Co., treasurer. New directors are: Ernest Lancashire, Union Metal Mfg. Co., Canton; R. L. Fasig, Ashland Malleable Iron Co., Ashland, O. and John Kerr Jr., Deming Co., Salem, O.

W. T. Cole, Canton Malleable Iron Co., Canton, showed the technicolor motion picture, "This Moving World," which was produced by the Malleable Founders' Society. The meeting was concluded with a review of the history and development of refractories and their applications in foundry practice which was presented by H. F. Randolph, ceramic engineer, Mexico Refractories Co., Mexico, Mo.—*Alexander Prentice, Stark Foundry Co.*

Chicago

OFFICERS for 1950-51 were elected and installed by Chicago Chapter of the AFS at its May 1 meeting, held at the Chicago Bar Association. Four roundtables featured the technical program and attracted an attendance of approximately 225 members and guests.

The new officers elected were those proposed by the nominating commit-

tee at the April meeting and reported in the May issue of THE FOUNDRY.

The gray iron division roundtable was addressed by Harold Sohner, metallurgist, International Harvester Co., Milwaukee, his subject being "Preventive Controls in the Foundry." Herbert F. Scobie, American Foundrymen's Society, Chicago, was chairman.

Kenny P. Smith, foreman, Chicago Malleable Castings Co., Chicago, spoke before the malleable division group meeting on "Standard Practice Problems." Cecil F. Semrau, operating metallurgist, Illinois Malleable Castings Co., Chicago, was chairman.

Nonferrous and pattern divisions combined efforts in a roundtable on "New Technique in Core Blowing," with Harry J. Jacobson, owner, Industrial Pattern Works, Chicago, as speaker. Chairman was Harry K. Swanson, owner, Swanson Pattern & Model Works, East Chicago, Ind.

"How Would You Head and Gate It?" was the subject discussed by the steel division round table. The panel of speakers included A. P. DiGirolamo, foreman, Chicago Steel Foundry Co., Chicago; B. A. Zikmund, president, Calumet Steel Castings Co., Hammond, Ind.; E. Grious, steel foundry, Link-Belt Co., Chicago; and John Bartus, foreman molding, Pettibone Mulliken Corp., Chicago. F. E. Kasch, foundry engineer, Pettibone Mulliken Corp., presided.— *Erle F. Ross, Howard C. Tuttle.*

Saginaw Valley

FOUR educational lectures were sponsored by Saginaw Valley Chapter of the AFS during March. Two meetings were held at Flint and two at Saginaw, one of which was a visit to the General Motors Corp. Central Foundry Division malleable plant. Since so many students wished to make this trip, the chapter members were asked not to go and a special visit was arranged for them on Apr. 20.

The chapter's Apr. 6 meeting, held at the Fischer Hotel, Frankenmuth, Mich., attracted about 200 members and guests. Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va., was the speaker. Mr. Kuniansky presented a sound movie, "Men and Molds," which featured foundry operations at the Lynchburg company. After the movie he presented an interesting discussion on nodular iron and in conclusion commented briefly on his experiences on a recent trip to Europe where he visited many foundries. — *Kenneth H. Priestley, Vassar Electroloy Products Inc.*

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USE NO HOOKS
50 LBS.
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New Officers and Directors Elected by AFS

NEW officers and seven new directors were elected by the American Foundrymen's Society at the annual business meeting held in Cleveland, May 10. They will take office following the annual meeting of the board of directors this summer.

Walton L. Woody, currently vice president, will succeed Edwin W. Horlebein as president of the society. The latter was named to a one-year term as a director. New vice president will be Walter L. Seelbach. Five new directors elected to three-year terms are J. J. McFadyen, J. O. Ostergren, Frank W. Shipley, James Thomson and E. C. Troy. Martin J. O'Brien Jr. was elected a director to fill the unexpired term of the late Alfred M. Fulton, Northern Malleable Iron Co., St. Paul, who died Feb. 15 in the second year of his three-year term.

Walton L. Woody

WALTON L. WOODY is vice president in charge of operations, National Malleable & Steel Castings Co., Cleveland. His entire career has been with that organization, which he joined in 1914 following graduation from Rose Polytechnic Institute as chemical engineer. First he was with the Indianapolis plant, later being transferred to the Cleveland works where he established the chemical laboratory. Later assignments were those of metallurgist, assistant superintendent and, in 1925, works manager. Following a brief period at the company's Chicago plant, Mr. Woody returned to Cleveland and in 1938 was made manager of the Sharon, Pa. plant. During the following five years a substantial expansion program was undertaken under his direction there and at the Melrose Park (Ill.) Works. He was elected to his present position in 1943. Mr. Woody was the first chairman of the Northeastern Ohio Chapter, and has been an active participant in the society's Malleable Division in addition to serving as a national director and vice president.

Walter L. Seelbach

WALTER L. SEELBACH, president of Superior Foundry Inc., Cleveland, long has been prominent in the gray iron industry. One of the organizers of the Gray Iron Institute, now the Gray Iron Founders' Society, he served two terms as its president, and he is also a past president of the Ohio Foundrymen's Society. Graduated from Case Institute of Technology in 1910, Mr. Seelbach joined the Forest City Foundries Co., Cleveland, that year, and subsequently became secretary-treasurer and vice president. He resigned the latter position in 1946 to head the Superior company. Mr. Seelbach is chairman of the Foundry Educational Foundation Case Institute Advisory Committee, and is also chairman of the Gray Iron Advisory Subcommittee to the Munitions Board, Washington.

J. J. McFadyen

J. J. MCFADYEN, general manager of Galt Malleable Iron Co., Galt, Ont., Canada, is a native of that city. Mr. McFadyen served his apprenticeship as patternmaker with Babcock-Wilcox & Goldie McCulloch Ltd. and joined the Galt Malleable company in 1908. He was named general superintendent in 1916 and was appointed vice president and general manager in 1947. Mr. McFadyen has been a member of the society since 1917, and has served as chairman of the Ontario Chapter, which he assisted in organizing. He has also been active on several of the society's Malleable Division technical committees.

J. O. Ostergren

J. O. OSTERGREN, president and general manager of Lakey Foundry & Machine Co., Muskegon, Mich., entered the foundry industry as an apprentice molder at Enterprise Brass Works, Muskegon Heights, Mich., in the early 1900's. He transferred to the Shaw Box Electric Co., Muskegon, two years later as an apprentice patternmaker. During his journeyman period he worked at various pattern shops in Detroit and then was placed in charge of wood and metal patterns for the Holmes Machine Co., Sparta, Mich., and later held a similar position at the Dodge Bros. foundry when the first Dodge automobile was built. He then progressed from foreman of Muskegon Pattern Works to supervisor of patterns for Continental Motors Corp., and general manager of Master Pattern Works, Muskegon. In 1922 he joined Lakey Foundry & Machine Co., starting as superintendent of the pattern department, later becoming foundry superintendent, vice president, general manager and in 1940 president of the company. He is one of the organizers of the Western Michigan Chapter.

Frank W. Shipley

FRANK W. SHIPLEY is foundry manager of the Caterpillar Tractor Co., Peoria, Ill. A graduate of Purdue University, 1921, Mr. Shipley was associated with the Studebaker Corp., South Bend, Ind., for four years, subsequently becoming foundry metallurgist at Lakey Foundry & Machine Co., Muskegon Mich., and at Fairbanks, Morse & Co., Beloit, Wis. Joining Caterpillar Tractor in 1929, Mr. Shipley has been foundry metallurgist and general superintendent, being appointed to his present position in 1944. As an active member of AFS, Mr. Shipley served as chairman of the Central Illinois Chapter during 1948-49, and as a member of various committees of the Educational Division.

James Thomson

JAMES THOMSON, chief works engineer, Continental Foundry & Machine Co., East Chicago, Ind., has served the AFS as chairman of its Chicago Chapter and as chairman of the plant and plant equipment committee. A native of Scotland, he was graduated from Washington and Jefferson College. Mr. Thomson served an apprenticeship as a wood and photo engraver and held positions as draftsman with several Pittsburgh metals and engineering firms prior to becoming plant engineer for United Engineering & Foundry Co., Pittsburgh, from 1906 to 1916. He has held his present position since that time.

E. C. Troy

E. C. TROY, foundry engineer of Palmyra, N. J., is a past chairman of the Philadelphia Chapter of AFS

(*Concluded on page* 192)

COMPLETE SAND HANDLING SYSTEMS

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serviced

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ENGINEERING CO.

A complete sand handling system. Shakeout sand elevator, overhead storage, and mullers in background. Conditioned sand is delivered to overhead molding hoppers. Completed molds are set out on gravity conveyors for pouring from overhead monorail cranes. System handles 60 tons of sand per hour.

This unit is the heart of a sand handling system. Elevator carries shakeout sand to screen and bin conditioning unit. Sand passes into muller in batches as required. Prepared sand is delivered by conveyor to molding hoppers. This unit is designed for large or small systems.

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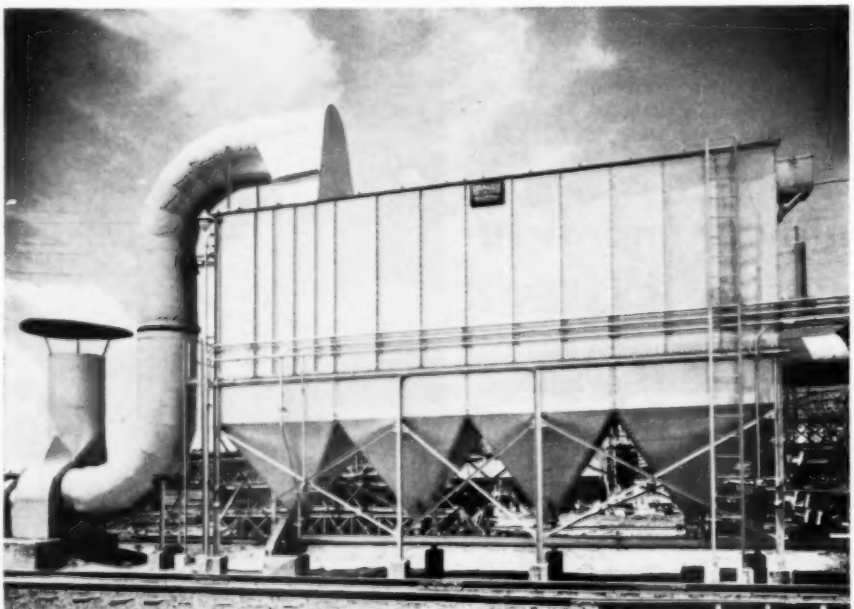

Write for Bulletin No. 304

DRACCO CORPORATION

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(*Concluded from page* 190)

and a member of the Steel Division's program and papers and also heat transfer committees. Mr. Troy, a graduate in metallurgical engineering from Michigan College of Mining and Technology, entered the foundry industry as an assistant chemist with Detroit Steel Casting Co. prior to entering college. Upon his graduation he returned to that company as assistant to the vice president and metallurgist. In 1937 he joined Dodge Steel Co., Philadelphia as metallurgist and became chief metallurgist in 1942. He was elected vice president in charge of research and development for Dodge Steel in 1947, resigning that position the following year to engage in foundry sales engineering work. In addition to his AFS membership, Mr. Troy has served on committees of the Steel Founders' Society of America, American Society for Metals, American Society for Testing Materials, American Institute of Mechanical Engineers and the Benjamin Franklin Institute.

Martin J. O'Brien Jr.

MARTIN J. O'BRIEN JR. is works manager, Symington-Gould Corp., Depew, N. Y. After studying mechanical engineering through correspondence courses, Mr. O'Brien became laboratory assistant with American Steel Foundries, East St. Louis, Ill., later becoming an apprentice in that company's Granite City, Ill. plant. He resigned to become special apprentice with Symington-Gould and has since served as assistant foreman, assistant superintendent, superintendent, assistant works manager, and has been works manager since last year. Mr. O'Brien is a past chairman of the Western New York Chapter of AFS.

Loans Gating Films

Three colored sound films made by the United States Naval Research Laboratories have been loaned to British foundry organizations. The films, widely shown in this country, cover "Gating Systems for Metal Casting," "Finger Gating," and "Step Gating." They were shown Apr. 5 to the London branch of the Institute of British Foundrymen, through arrangements with the Research and Development Division, British Steelfounders' Association.

Bedford Foundry & Machine Co., Bedford, Ind., on May 6 suffered fire loss estimated at $40,000. It is believed the blaze started in the coreroom.

NEW CUPOLA DESIGN

(*Continued from page* 85)

through the siphon into the runner, where it flows into a tilting receiver. A short time after tapping and as slag accumulates in the well, the slag and metal levels reach a state of balance and remain such during the melt. The slag rises by virtue of its lower specific gravity along the upper slope, passing over the slag notch at the side of the box. As melting continues, the iron and slag run off automatically; the levels, which differ in each part of the system, remain constant.

A number of experimental melts were made. In all melts the coke bed was 42 in. above the top tuyeres; the flux consisted of limestone and fluorspar, the latter being added to give the basic slag sufficient fluidity to flow over the slag notch. The weight of metal in each charge was 500 lb and the air supply set to give a melting rate of 3500 lb per hour. The experimental melts were planned to cover mixtures suitable for gray iron, high duty irons, malleable iron and converter steel; thus the percentage of steel was progressively increased from 20 per cent to 100 per cent throughout the series.

Check Sulphur Pickup

In the gray iron charge suitable for cylinder blocks and representative of normal gray iron analysis, not only was sulphur pickup checked, but even reduced from the calculated amount in the charge. Using the same grade of coke and identical mixture in an acid cupola, the final sulphur would be 0.115 per cent, whereas the average sulphur over three hours in the basic cupola gave an average of 0.063 per cent in one melt and 0.049 per cent in a second melt. In the latter melt, an increase in the limestone added probably accounted for the lower sulphur figure. A third melt gave a closer indication of the possibilities of desulphurization in the basic cupola. In this melt, the charged material consisted solely of gray iron scrap with an initial sulphur content of 0.12 per cent, and this metal was desulphurized to give an average figure of 0.056 per cent. In further melts, the steel was progressively increased to 100 per cent, plus ferromanganese and ferrosilicon, and were representative of mixtures suitable for the production of low-carbon irons, malleable duplex metal and tropenas steel.

In each melt the first tap from

(*Continued on page* 196)

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NORMALIZED
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The Outstanding MALLEABLE SHOT, GRIT
Amazingly durable. It is stress relieved and there is practically no shattering.
Lasts at least twice as long as ordinary abrasives, and reduces equipment wear at least 50% to 75%.
Exclusive screening process insures greatest uniformity.
Quality Abrasives Pay Off!
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DRAWN STEEL SHOT
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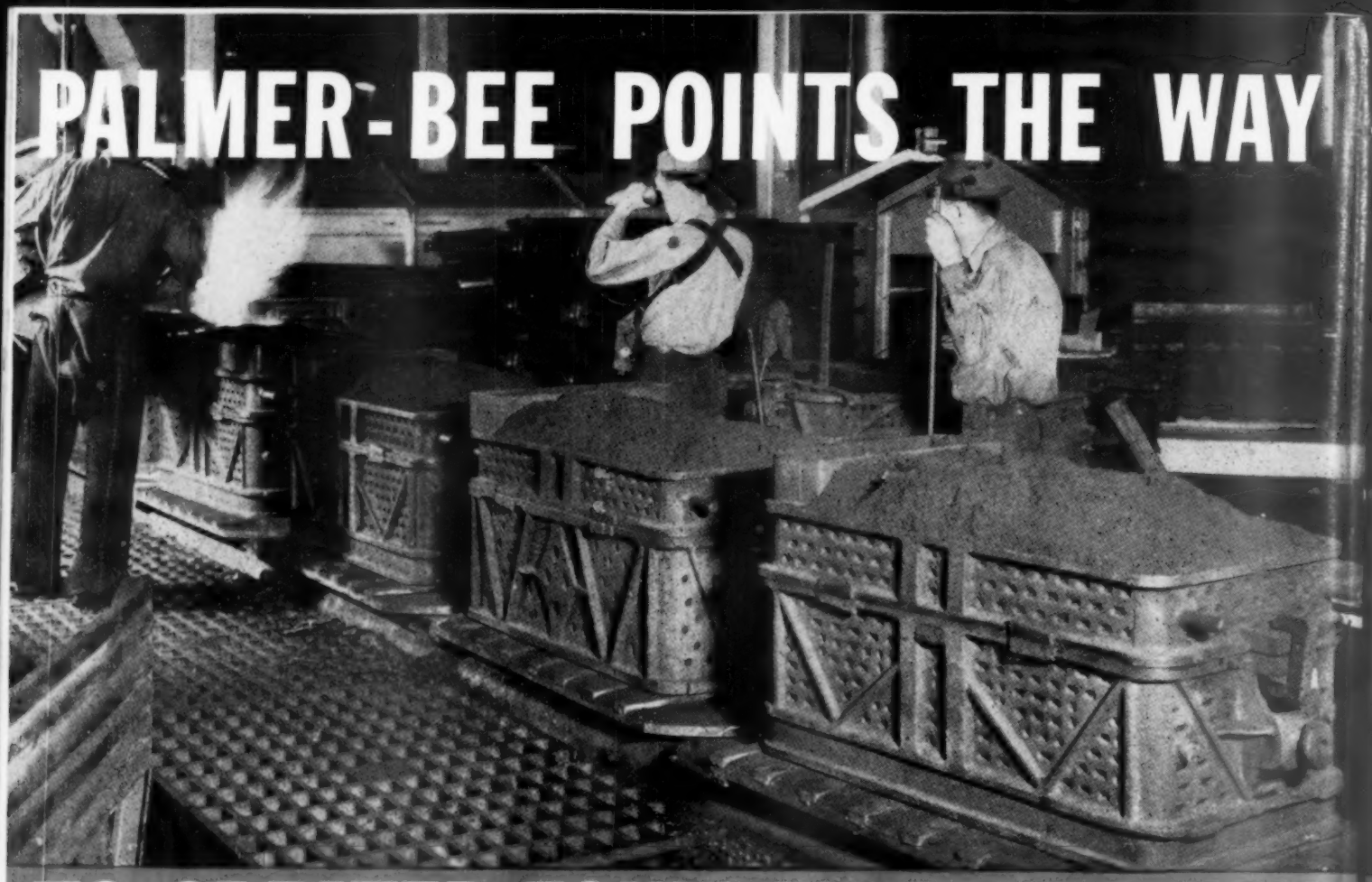
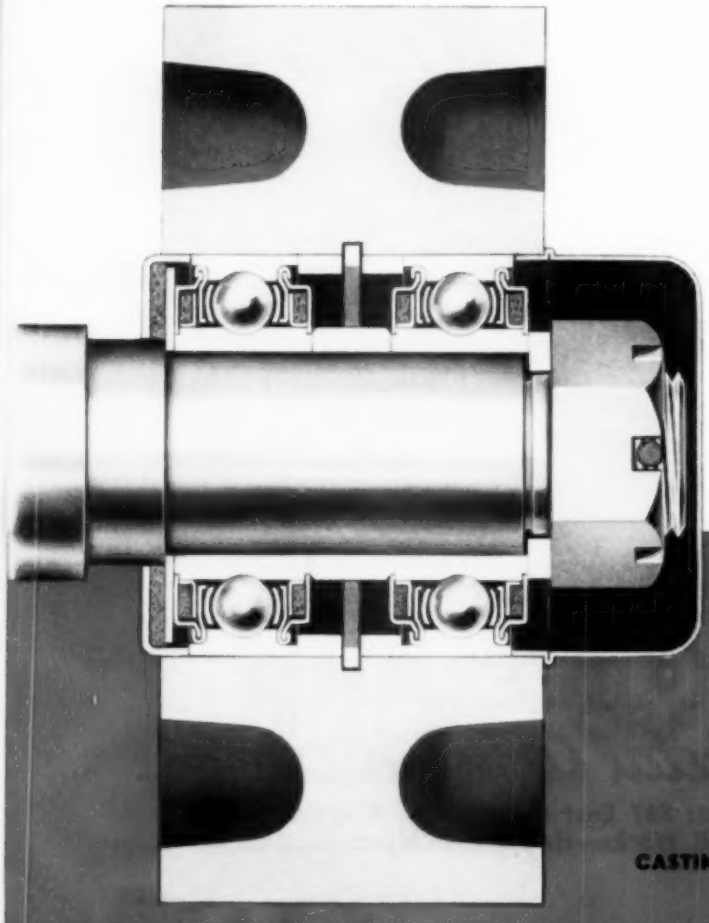
PALMER-BEE POINTS THE WAY



TO GREATER FOUNDRY EFFICIENCY



MOLD CONVEYOR CAR WHEEL AND AXLE

• Illustrated above is a Palmer-Bee Heavy Duty Mold Conveyor passing through a pouring zone.

When making a horizontal turn, of which there can be many, the mold car axles automatically, and without guides of any kind, remain radial with the center point of the curve, thus permitting the car wheels to rotate independently and freely without chatter or sliding action. This feature, when necessary, makes possible small radius curves, and ultra smooth running through the core setting and metal pouring stations.

The sectional view opposite shows the mold car wheel assembly complete with "Lubricated for Life" bearings perfectly sealed and shielded from grit and dirt.

All rollers are made of drop forged steel and are induction hardened

ALL TYPES OF CONVEYORS FOR THE FOUNDRY

"LUBRICATED for LIFE"

CASTING COOLING APRON CONVEYORS
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BUCKET ELEVATORS

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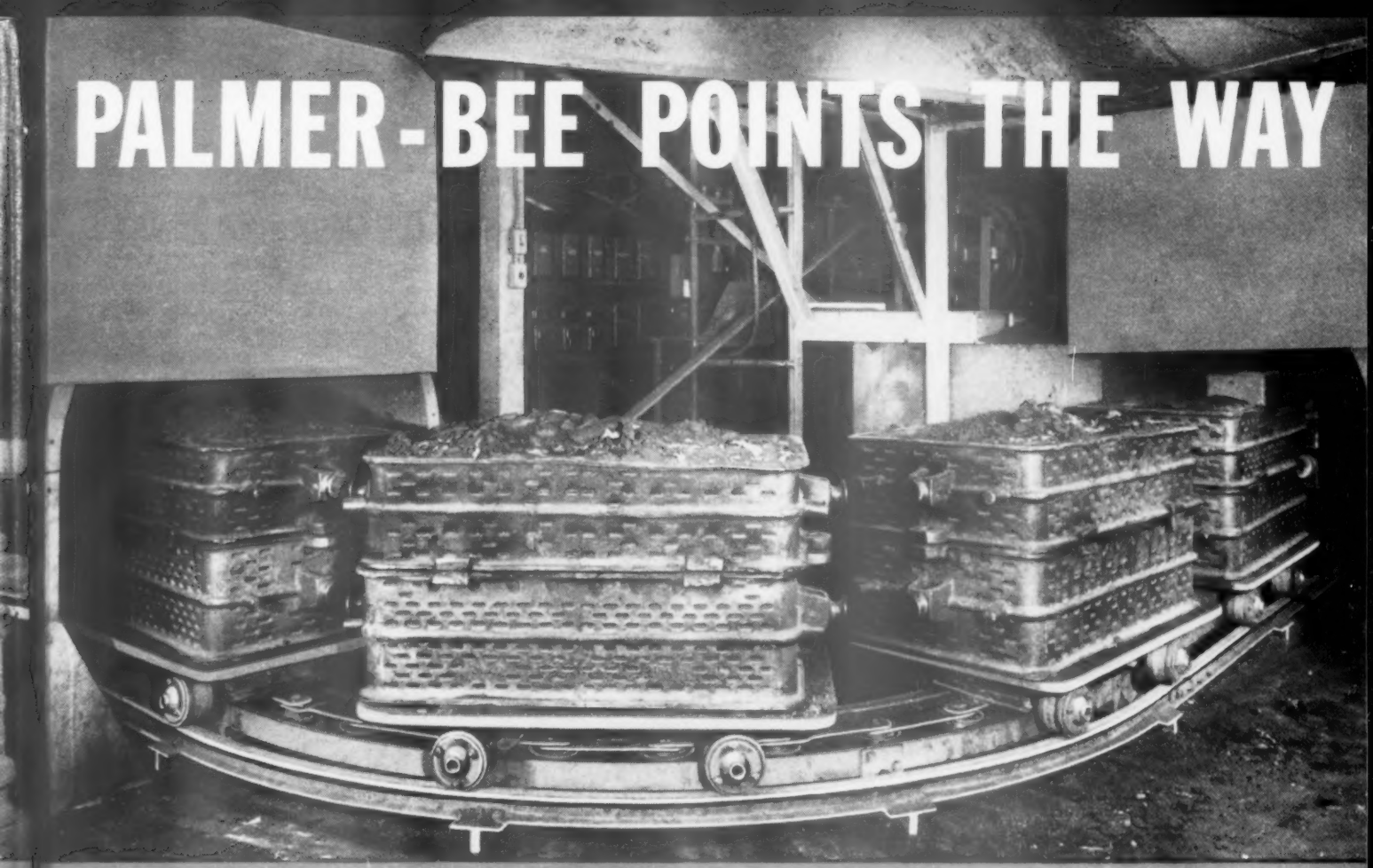


THROUGH LIFETIME LUBRICATION

The Palmer-Bee Mould Conveyors equipped with Lubricated for Life Bearings have been in operation for 12 years in one of the largest productive foundries in this country . . . for the most part two shifts . . . without a single bearing or wheel replacement. A lifetime of 20 years or more is indicated.

The view opposite shows the mold conveyor chain roller equipped with "Lubricated for Life" bearings. In order to conserve floor space some layouts require numerous short radius turns. The diagram below illustrates the point in an actual installation, and shows where the chain pull builds up rapidly making necessary either multiple drives or anti-friction chain rollers. It is here that "L for L" bearings again came to the rescue and made the curves feel like straight track.

SECTION THROUGH MOLD CONVEYOR CHAIN

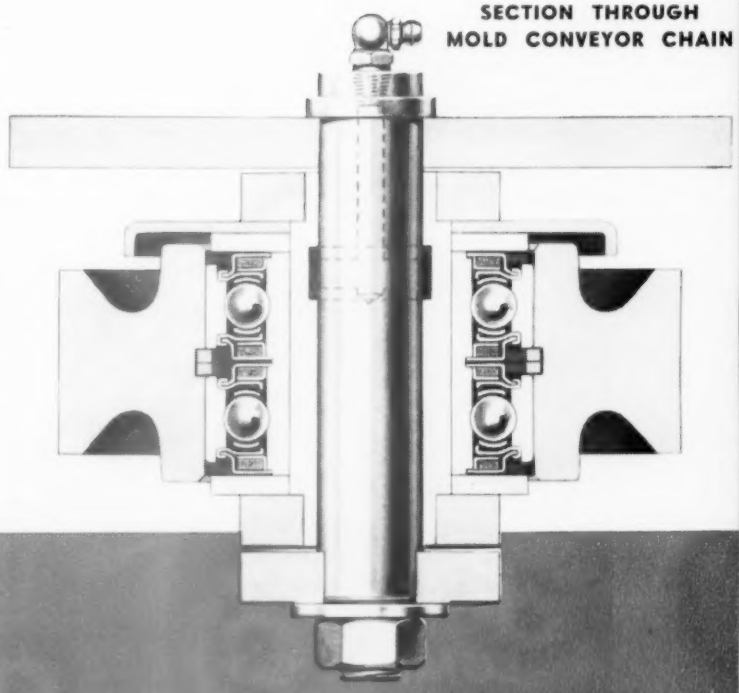
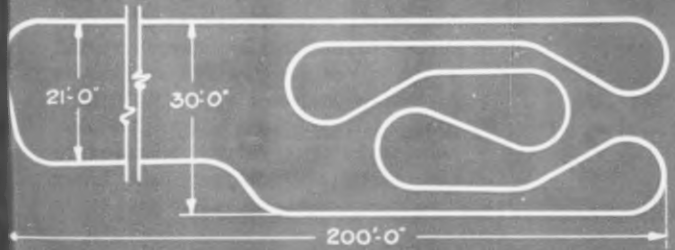


Diagram of 620' Mold Conveyor Installation



LESS FLOOR SPACE—LESS HANDLING

All rollers are made of drop forged steel and are induction hardened

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(*Continued from page* 193)

the cupola gave a high sulphur figure because at this stage there is only a low volume of slag available in the well and the initial temperatures are below normal. This effect can be partly offset by making an addition of limestone to the coke bed. The effect of quantity of slag in the well was again instanced in certain melts, when an increase of sulphur was apparent, which could be traced to an enlargement of the tap hole through erosion. When this occurs, the slag level in the cupola is automatically lowered

Examine the Slag

Observations on the type of slag produced were made during the course of the experiments, and whereas the acid cupola slags, by virtue of their siliceous nature, are somewhat vitreous in appearance, the basic slag showed a distinct chalky appearance, particularly when desulphurization was at its maximum. The color generally varied from pale brown to dark brown, the former slag corresponding to low sulphur figures from the cupola and the latter to the higher figures. The only apparent difference between the two slags was in the FeO and MnO contents, and an increase from 0.50 per cent to 1.50 per cent of each of these constituents accounted for the change in color, as also the desulphurizing properties. By over-blowing the cupola, thus creating an oxidizing condition, it was found that the sulphur would rise from 0.050 per cent to 0.075 per cent, with a change in the color of the slag to dark brown.

As a result of these experiments, it was established that in a basic-lined cupola the slag produced was capable of desulphurizing the metal in the cupola because of its increased basicity. The extent of the desulphurization depended not only on the quantity of base available but also on the oxide concentration. The factors in cupola operation, such as low bed height and unbalanced quantities of fuel and air, which give rise to an oxidizing condition, are well known and should be avoided.

Since these experiments were made, the basic cupola process has been adopted at the Dagenham foundry on a full-scale production unit. An interesting combination is now in use. The basic cupola concerned is occupied in melting low-carbon metal, which is run directly into an electric furnace acting as a supply unit for a continuous molding system. The furnace is being regularly operated to give metal with 50 per cent lower

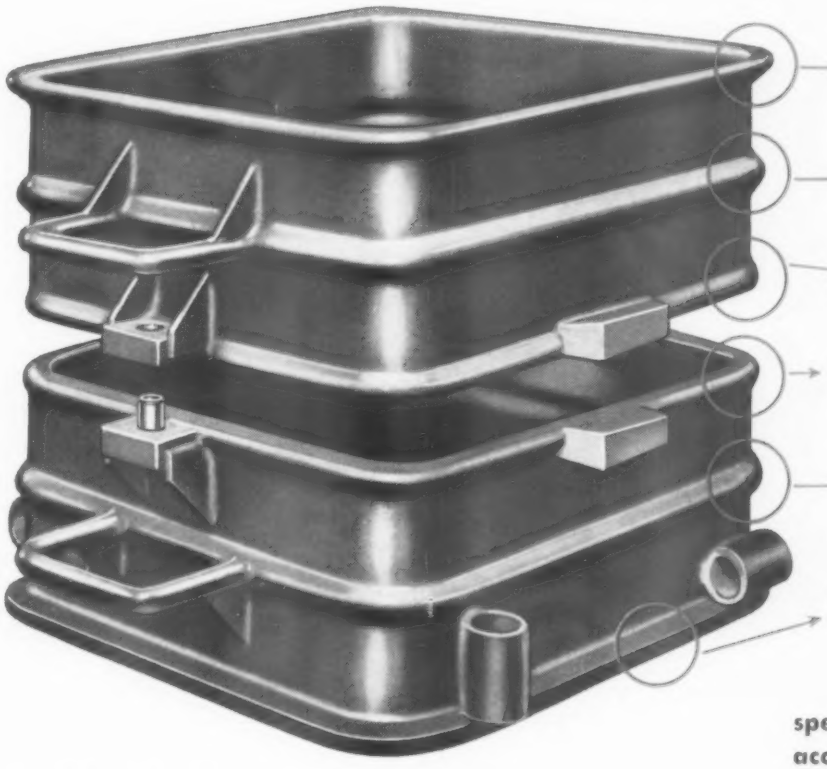
(*Concluded on page* 199)

HERE'S *Custom Tailoring* IN STEEL FLASKS

Different foundry systems require different styles of Flask construction — the same Flask will not properly serve all molding and handling conditions.

The Flask shown here is a good example of Shanafelt "custom tailoring" in Steel Flasks. The reinforcement is varied to suit the need — flanges are designed and placed only where needed, thereby saving unnecessary cost and weight.

If you want your Flasks made to fit your own special conditions, just tell us your requirements and our engineers will work out the construction details.



This special flange gives added strength, a wide bearing surface, and a smooth rolled edge.

The Shanafelt corrugation adds strength to the sidewalls.

This Flask gets no beating at the parting, so these flanges were kept light to hold down the weight of the Flask.

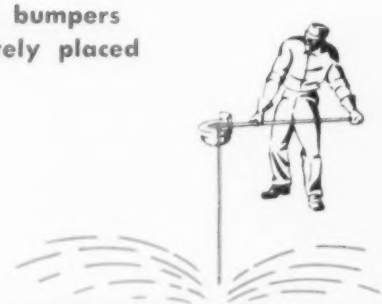
The way this Flask is handled, here is a hard service point. The heavy welded flange is extra wide to fit the conveyor.

special bumpers accurately placed

special stub pin with long head

special clamping lugs fit their standard clamp

special handles to make exact overall width to fit sling



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Precision built by a company with 96 Years of "Know-How"—Your assurance of proper performance from the moment of installation.

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CURTIS AIR HOIST

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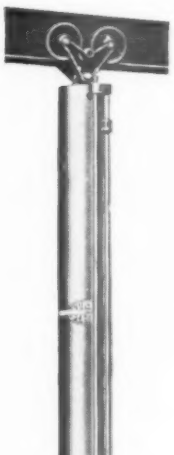
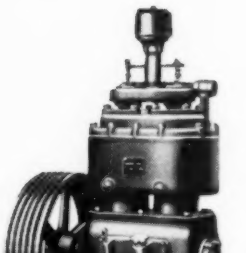
- Low-Cost Lifting





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- Fully Enclosed
- Dust and Dirt-proof
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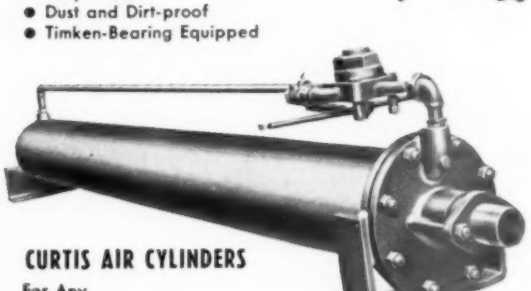

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☐ Air Cylinders

☐ Air Compressors

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STREET.....

CITY.....ZONE....STATE.....

(*Concluded from page* 196)

sulphur content than was obtained in the acid furnace and, when required, final figures of between 0.030 per cent and 0.050 per cent can be obtained by application of the principles outlined above.

The cupola has a lining thickness of 12 in. and the internal diameter is 36 in. with a normal melting rate of 9500 lb of metal per hour. The continuous tapping system is employed, metal flowing continuously into the electric furnace, the inlet of which is 4 ft from the cupola tapping hole. Heat loss in transfer is thus reduced to a minimium. Stabilized dolomite, prepared in the manner described above, was again used and special precautions were taken during ramming to allow for after expansion, which amounts to about 1.50 per cent for this material. Expansion strips of wood were rammed in longitudinally with the material and spaced 2 ft apart, the dimensions of the strips being 18 x 9 in. with a thickness of ⅜-in. tapered to 1/16-in., the tapered section pointing toward the shell. These strips were allowed to burn out during the preheating.

Vent the Lining

No backing bricks were used for this lining, it being considered unnecessary, but the material was vented at the shell by using steel rods ⅜-in. diameter, these being gradually raised as ramming proceeded. An alternate method is to use asbestos steam pipe lagging as a backing material, and a thickness of 1 in. against the shell is sufficient to accommodate the expansion. The basic lining was taken to a height of 4 ft 6 in. above the top tuyeres; at this height it has not been found essential to introduce a neutral refractory at the junction of the basic and acid materials.

Combining these developments, it has been established by experimentation and operation in service that basic conditions suitable for desulphurization can be obtained in the water-cooled basic cupola and, by limiting the basic lining materials to the hearth, there is little difference in cost between this method and the acid cupola, particularly if allowance be made for the cost of ladle desulphurization with its attendant processing.

The combination of methods described, allowing for melting operations under basic slag conditions with resultant desulphurization, may help considerably in the processing of the new low-sulphur irons, nodular irons being a case in point.

"FALLS BRAND" ALLOYS
AMERICA'S LARGEST PRODUCERS OF ALLOYS

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MASTER ALLOYS

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WRITE FOR COMPLETE DETAILS

NIAGARA FALLS
Smelting & Refining Division
Continental Copper & Steel Industries, Inc.
BUFFALO 23, NEW YORK

Adventures of BILL

By PAT DWYER
Drawings by RICHEY

THE other day," I said to Bill, "I met a man whose story in a vivid manner brought to mind the ancient parable about the householder who went down to the market place and hired a number of laborers to work in his vineyard. Although I have read the parable many times and have heard it expounded times without number by professional expounders, I never have been satisfied with the parable as it stands, or to the manner in which it has been defended and held up as a solution of the general industrial problem. One feature stands out clearly and dwarfs all others. Pathos, tragedy and heartbreak, hopelessness of the man confined within a stone wall of circumstances over which he has no control —all are concentrated in a single sentence.

"Strolling through the market place at the eleventh hour the householder asks a loafer why he is not working. The man might have countered with 'What's that to you?' or 'Who wants to know?' or 'I am waiting for a bus,' or 'Pardon me. We have not been introduced,' or any one of a dozen ready retorts that have been employed in situations of this kind.

"The man was down and out, at the end of the rope. Not enough energy to think of any snappy retort. Translating his reply into the ordinary language of the market place idle man, he answered briefly and truthfully: 'I ain't workin' because nobody ain't give me no job . That's why I ain't workin'.'

"Here he was ready and willing, actually anxious to work, and he was stymied in his honest attitude by the fact that no employer would give him a chance to exchange his service for food, clothing, shelter, the actual requirements for hanging on to the string of life. The hard-hearted and cynical might say: 'Under these conditions why does he want to prolong his existence and misery?' I have neither the knowledge or desire to enter that labyrinth. Here just to refresh your memory, or possibly tell you something new, I shall read the chapter:

A householder went out early in the morning to hire laborers. And when he had agreed with the laborers for a shilling a day, he sent them into his vineyard.

"A shilling a day, hey?" Bill commented. "After they nipped out the social security, old age pension, hospitalization, withholding tax, insurance, and a small garnishee payment on a loan, the guy would not need to stagger under the remainder of the load."

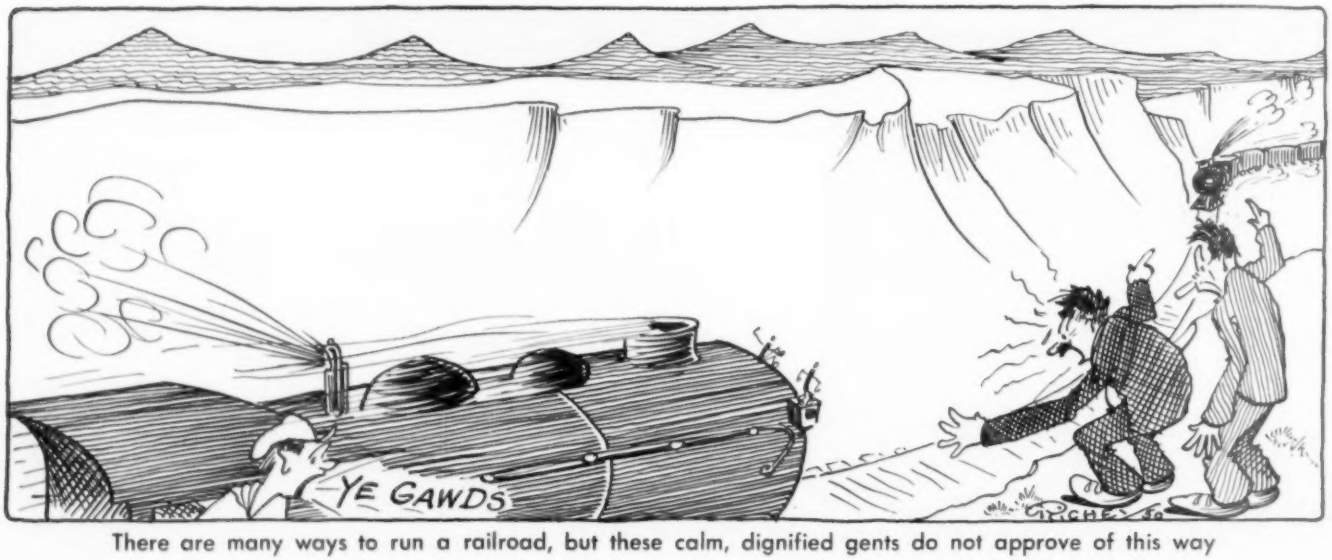
"Those improvements were not introduced until many years later when people were more highly civilized. Le's see, where was I?"

And he went out about the third hour and saw others standing idle in the market place. And to them he said Go ye also into the vineyard, and whatever is right I will give to you. And they went their way. Again he went out about the sixth and the ninth hour and did likewise. And about the eleventh hour, and found others standing, and he saith to them Why stand ye here all the day idle? They said to him, Because no man hath hired us. He saith unto them go ye also into the vineyard.

And when even was come, the lord of the vineyard saith unto his steward, Call the laborers and pay them their hire, beginning from the last unto the first. And when they that came that were hired about the eleventh hour, they received every man a shilling. And when the first came, they supposed that they would receive more, and they likewise received every man a shilling. And when they received it they murmured against the householder. Saying these last have spent but one hour, and thou hast made them equal unto us who have borne the burden of the day and the scorching heat. But he answered and said to one of them, Friend, I do thee no wrong. Didst thou not agree with me for a shilling? Take up that which is thine and go thy way. It is my will to give unto this last even as to thee. Is it not lawful for me to do what I will with mine own? Or is thine eye evil because I am good?

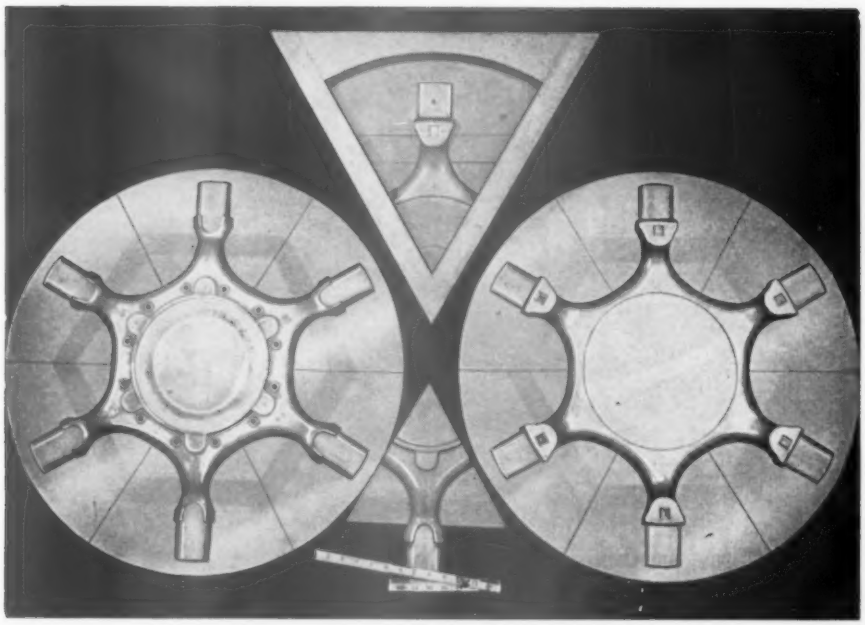
"Probably millions of men have read that story since Matthew slowly knocked out Chapter XX of his memoirs with a sharp-pointed stylus on a strip of papyrus. You may ask how do I know he used papyrus instead of the back of an old envelope, or a sheet of brown paper received the day before wrapped around a hunk of fish from the local grocery store. Every person knows that nearly all impor-

(*Continued on page* 202)



There are many ways to run a railroad, but these calm, dignified gents do not approve of this way

Illustration at right shows cope and drag equipment for truck wheel, made from one spoke (1-6) of wheel. Photograph by courtesy of Erie Malleable Iron Company.



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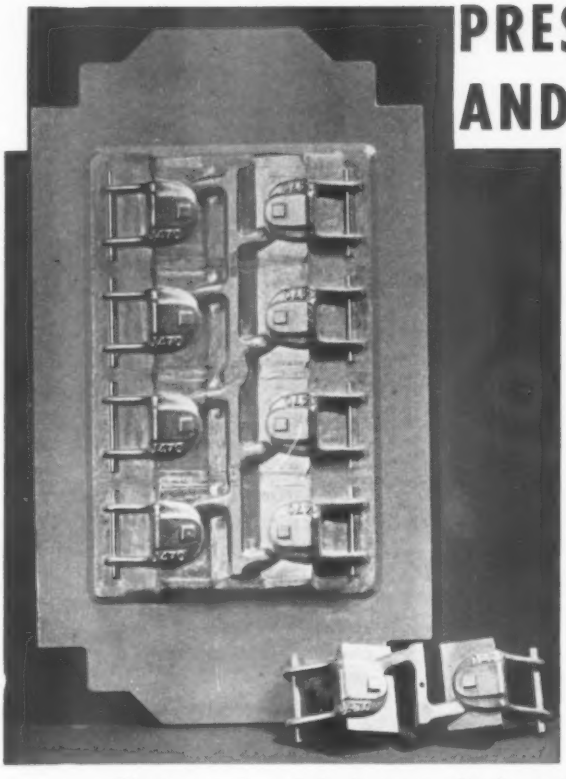

You sure can do that, because Plaster Process matchplates are accurately reproduced from one master pattern in plaster molds and are cast under pressure. Our pattern castings and core box castings eliminate the former necessity of lightening core boxes and of "backing off" master patterns. Also made by the same method are multiple core boxes with flat or irregular partings and white metal dryer patterns properly cleared to fit the cores.

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Write for price schedule and layout sheets.

Photograph at left shows multiple-pattern matchplate made from single master pattern.

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BRASS • ALUMINUM • MAGNESIUM
AND ALL OTHER
NON-FERROUS ALLOYS

HAVE YOU INVESTIGATED THEM FOR YOUR MELTING PROBLEMS?

The Campbell-Hausfeld Co.
300-320 MOORE ST. HARRISON, OHIO

(*Continued from page* 200)

tant historical documents have been written on the backs of old envelopes or other convenient media. Answering your very interesting question, I don't know how or on what material the message was written. Does that answer your question satisfactorily? Thank you.

"Presumably these ancient writers, even as we of the present generation, occasionally spelled a word wrong. How did they erase the word, or make correction with the old stylus? Did they gouge it out with a chisel, fill the impression with some kind of googum, or did they employ the technique still in existence with modern writers, and simply *X* it out? Another point of interest, if one had the time to delve a little deeper into the subject, was the writer's standing with Independent, Protective and Benevolent Order of Scribes and Pharisees, Local 44. Had he been properly initiated, and was his due book fully paid up to date?

"Upon his application for membership, a snooty investigating committee would sniff a highly disapproving sniff over his admission that before taking up the writing trade he was a tax collector. It is fairly safe to presume that in those days tax collectors pre, pro or ex, enjoyed the affection, admiration and esteem of the public to approximately the same extent as at present. As a certain highly placed official once said in discussing the chances of another estimable gentleman in his race for the governorship of a certain state, 'He is not exactly a spray of poison ivy, but on the other hand he has about as much personal magnetism as a lead nail!'

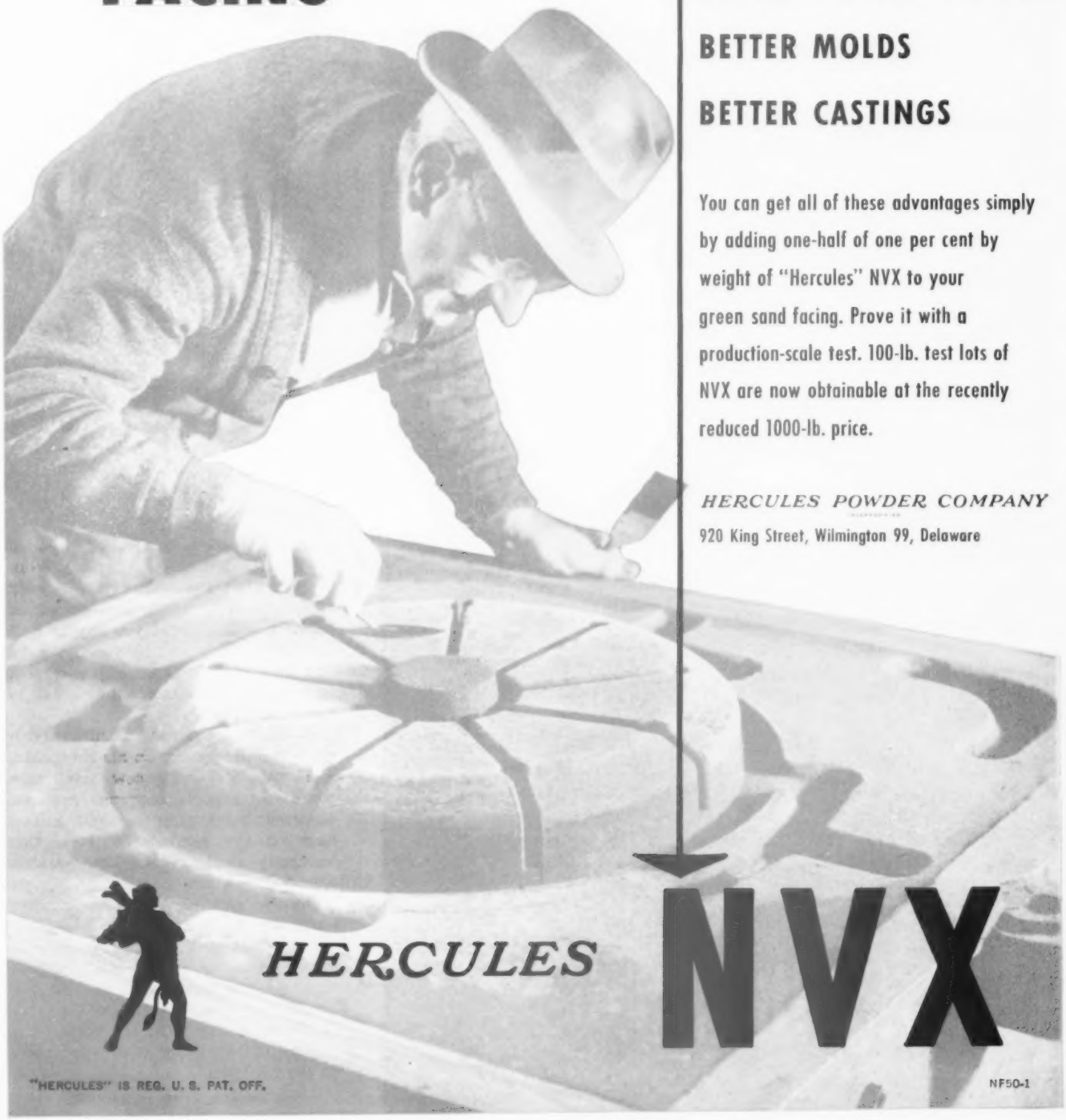
"During the past several hundred years since the works of ancient writers have been available in printed form, the parable of the vineyard has been read all over the world by millions of men under any and all conditions, in war and peace, in sickness and health, in affluence and poverty, in palace and hovel, on lonely night watches at sea, and just as lonely nights by a camp fire, or in a hotel bedroom.

"The list may be extended indefinitely by any person with the necessary time and patience. Cross-word-puzzle addicts and avid seekers after the last word in a radio limerick jingle that is guaranteed to win an illuminated washboard or a deep-sea diving outfit, probably need only this mild word of encouragement to set them off baying on the trail. Since the result of the hunt will add just about as much to the general fund of human knowledge as the combined work of all the cross-word puzzlers

(*Continued on page* 204)

BETTER 4 WAYS

FOR GREEN SAND FACING



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BETTER MOLDS

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You can get all of these advantages simply by adding one-half of one per cent by weight of "Hercules" NVX to your green sand facing. Prove it with a production-scale test. 100-lb. test lots of NVX are now obtainable at the recently reduced 1000-lb. price.

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HERCULES **NVX**

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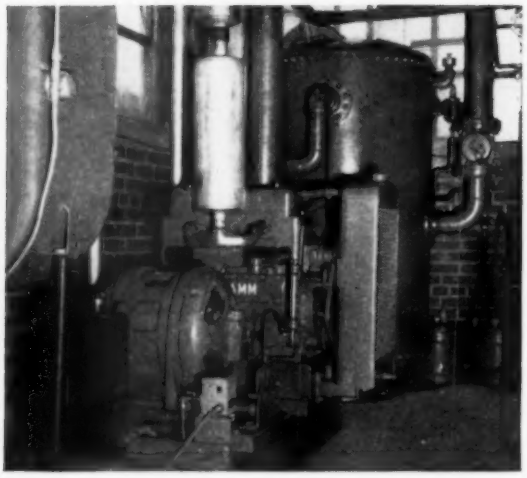
Unistage COMPRESSORS



Model 105 Schramm *Unistage* V-Belt Driven Compressor installation in a large industrial plant. Automatic belt tightener which tightens belts in proportion to load, optional equipment at slight additional cost.

FOR PRODUCTION and MAINTENANCE FOR SPEEDY PNEUMATIC TOOLS

SCHRAMM INC. offers a complete line of Industrial Compressors in sizes ranging from . . . 2 to 600 cubic feet displacement . . . Built and designed for continuous heavy duty service with a minimum of attention.

Available in "V" or Flat Belt Drive . . . on base for belt drive from motor or engine . . . or, with direct motor drive. No special foundation required . . . can be bolted to any substantial floor.

Accessories essential to any modern industrial installation can also be provided.

Write for Bulletin # 4910.

Important Features

Compact . . . Easy to Install
Mechanical Intake Valve
Force Feed Lubrication
100% Water Cooled
En Bloc Construction
Easy Accessibility
Vibrationless
More Bearing Surface

SCHRAMM INC.

THE COMPRESSOR PEOPLE • WEST CHESTER • PENNSYLVANIA

(*Continued from page* 202)

and radio jinglers for any given period, say from NRA to NUTS, numerical and statistical details are not included in the present survey.

"Talking about the radio," Bill interrupted, "reminds me it is about time for the reappearance of the hoary old railroad story. The dialect of course, depends on local conditions, and the skill, or lack of skill of the performer.

"A railroad locomotive fireman seeking a seat and a little more money on the right hand side of the cab appeared before the board of examiners for examination.

" 'Suppose,' said the boss examiner, 'you were driving No. 4-11-44 at a 60-mile-an-hour clip on a single-line

A lotta smoke but no fire

road. Suddenly and without any bell or whistle warning a second train came around a curve, headed in your direction at an estimated speed of 70 mph. What would you say or do?

" 'Well, begor and by yiminy,' says our hero, 'Ah, dinna care to w-o-r-r-k for you. Dat bane one hell ov a vay to run a railroad.'

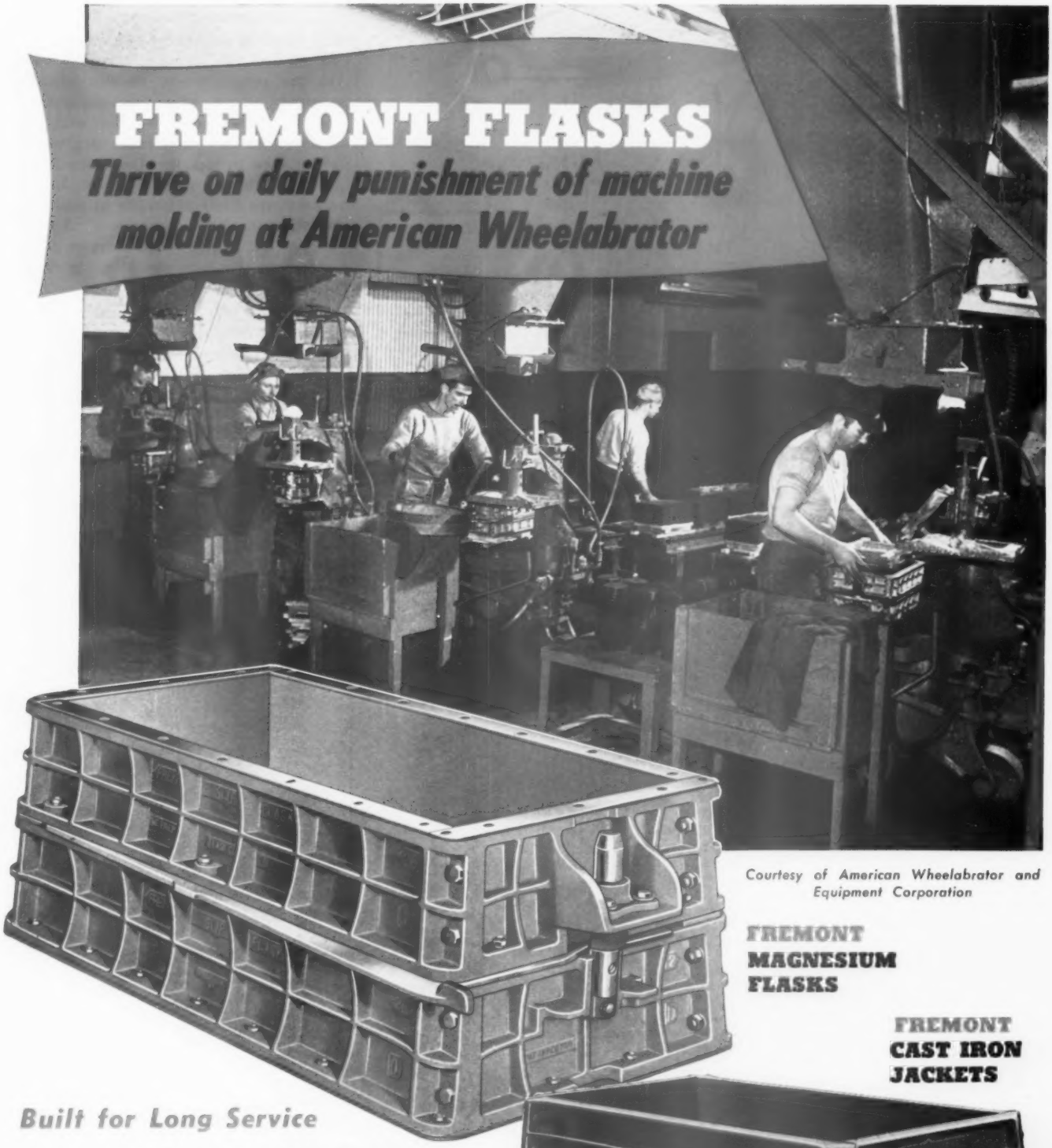
"Even the downiest consultant with the ink scarcely dry on his sheepskin, and with his shiny new brief case containing reports, clippings, reviews, assorted baby pictures, and a few ham on rye sandwiches, even this authority would declare that was no way to run a vineyard. On this single point, he and any foundry foreman stand on the same platform.

"Would it be imposing too great a strain on the imagination to suppose that some of the lads in the market place, turned thumbs down—and for the same reason—on the offer of a job in the vineyard? Several items in the list would seem to indicate that

(*Continued on page* 206)

FREMONT FLASKS

Thrive on daily punishment of machine molding at American Wheelabrator



Courtesy of American Wheelabrator and Equipment Corporation

FREMONT MAGNESIUM FLASKS

FREMONT CAST IRON JACKETS

Built for Long Service and Fast Production!

ALL ORDERS GIVEN PROMPT ATTENTION

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May we assist you, sir?

If you're on a merry-go-round about handling air or gas, *R-C dual-ability* can help you.

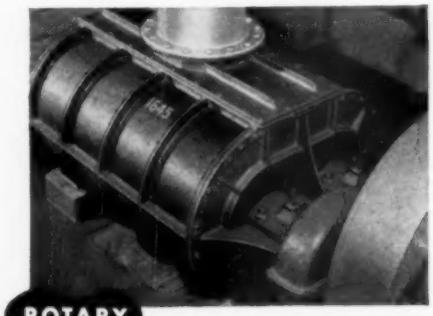
That's been our exclusive job for almost a century. We've developed the most extensive line of blowers, exhausters and gas pumps in the industry, with capacities from 5 cfm to 100,000 cfm.

We're the only builders offering that *dual choice* of both Centrifugal and Rotary Positive equipment. Thus, without bias, we can suggest units that meet most closely the requirements of the work to be done.

For new installations or replacements, look to us for your needs. Alert engineering teams up with modern construction to insure long-time, satisfactory performance of R-C equipment.

ROOTS-CONNERSVILLE BLOWER CORPORATION
506 Madison Avenue, Connersville, Indiana

Typical R-C Centrifugal Blower suitable for cupola service. Capacity 11,750 cfm.



Rotary Positive Cupola Blower with V-belt drive, for melting gray iron and non-ferrous metals. Capacity 8,600 cfm.

ROOTS-CONNERSVILLE
BLOWER BUILDERS R-C SINCE 1854
ONE OF THE DRESSER INDUSTRIES

(*Continued from page* 204)

the views of the men who owned vineyards, and the views of the lads who do the rough work, do not always coincide. Even after an experience of over 2000 years, the lion and the lamb show a considerable degree of reluctance in sharing the same little downy crib or pallet of straw. In recent years their attempts at slumber have not been improved by a G-R-E-A-T black bear intent on muscling into this here now sleeping racket."

"I don't see any necessity," Bill said, "for dragging little wooly lambs, ferocious lions or prowling bears into the discussion. Stick to one thing, a mild and philosophical comment on vineyards, their owners, and the gay cats who plant and sow and reap, or whatever it is that laborers do in vineyards, besides collecting their pay. Certainly the lads who showed up at 11 of the clock did not do much of anything.

"We might skip the legal and technical right, but elementally unjust payment system. The householder might get away with it the first day. On the second day he would find no vineyard candidates in the market place at the third, sixth or ninth hour. The boys would be attending an emergency meeting in the lodge room over Joe's Place, Jordan Boulevard. Principal item on the agenda would be a resolution to assess a fine of one shilling against any member so lost to all sense of shame and common decency as to accept any offer of employment before 11 o'clock, Far Eastern standard time, or 12 noon, local time. With an hour out for lunch, and another hour in walking from portal to portal, hanging up the coat, listening or partly listening to instructions from the local gaffer, picking up the wrong tools and getting in each other's way, the day might be curtailed to a gratifying extent. Temporary vineyard diggers, sprayers and pruners could be started toward earning their shilling about the time the lads in the local foundries were beginning to pour off the day's heat.

"An embarrassing inner voice suggests that the impatient reader is saying to himself—gentle readers of course long since have skipped the whole thing—the impatient reader is saying to himself or to any sympathetic soul in the immediate vicinity, "How about doing a little bit of work yourself? How about quitting the yapping and yawning and fiddling around? What, if anything, have you in mind?"

"Replying to this earnest and

(*Concluded on page* 208)

The furnace that
WOULDN'T COMPROMISE

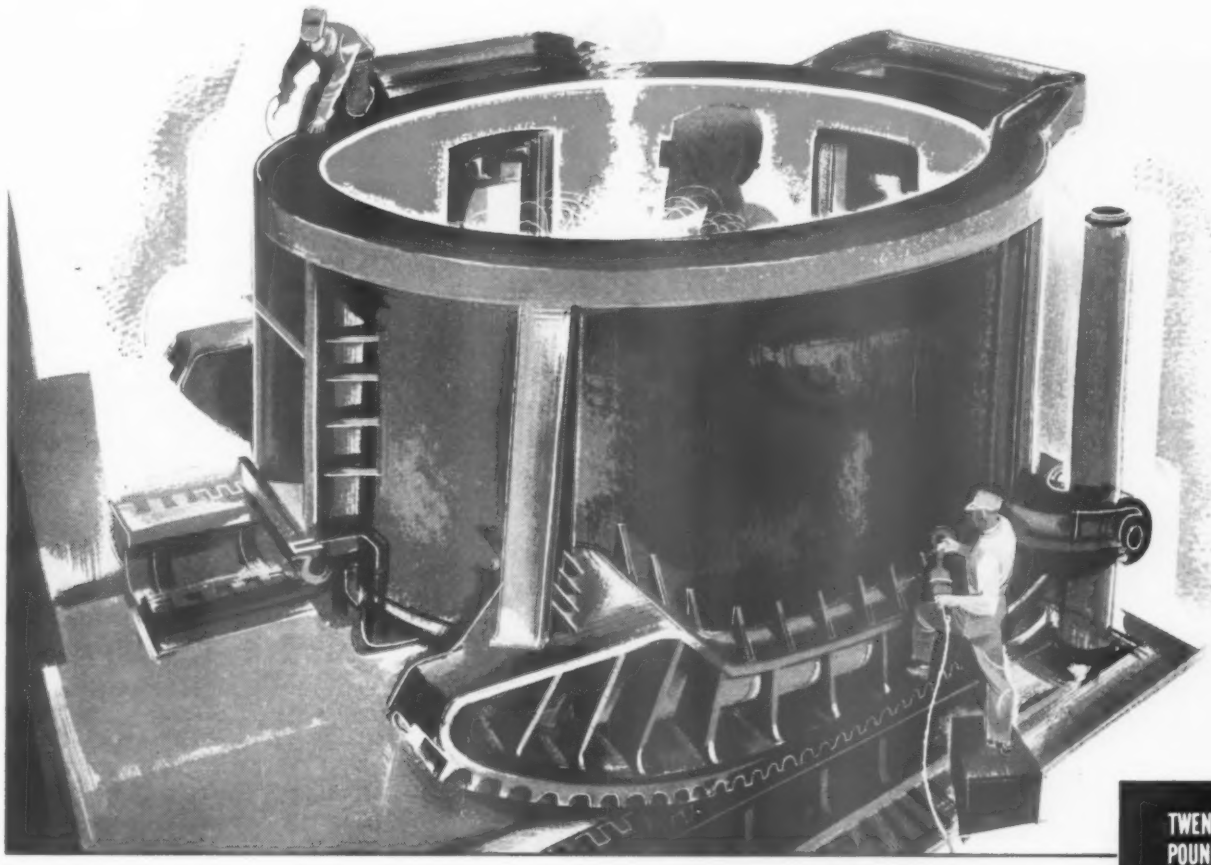
Burdens imposed on an electric arc furnace probe the soundness of every member. Electric currents thunder along near short-circuit levels, temperatures are terrific, physical loads way above rated figures. Lectromelt Furnaces and their auxiliary equipment have proved themselves in that kind of service.

Some years ago, when buyers were asking "How much?" before "How good?", Lectromelt set out to build a competitive model. Construction was to be lightened up generally. But as Moore, inventor of the Rapid Lectromelt Furnace, watched it grow, he wasn't happy. The furnace wasn't Lectromelt.

The "competitive model" was never built. The finished furnace had all the refinements developed by Lectromelt throughout the years. The wisdom of this thinking is reflected in these facts: Lectromelt Furnace users buy mighty few replacement parts. Furnaces installed many years ago are still going strong.

Refusal to compromise is an important point to look for when considering an electric furnace. For helpful data, write for Bulletin No. 7. Pittsburgh Lectromelt Furnace Corporation, 314 32nd Street, Pittsburgh 30, Pennsylvania.

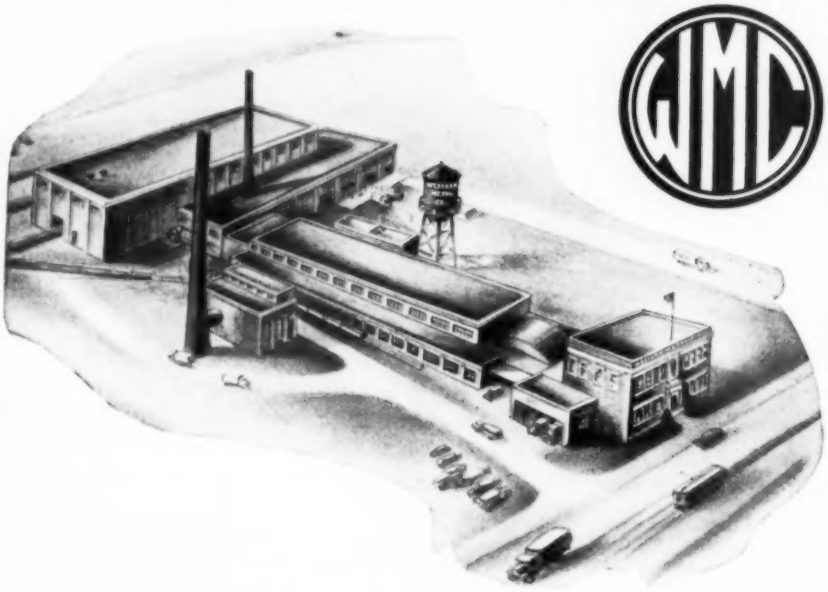
Manufactured in . . . CANADA: Lectromelt Furnaces of Canada, Ltd., Toronto 2 . . . ENGLAND: Birlec, Ltd., Birmingham . . . SWEDEN: Birlec Elektkougnar A/B, Stockholm . . . AUSTRALIA: Birlec, Ltd., Sydney . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilboa . . . ITALY: Forni Stein, Genoa.



WHEN YOU MELT... MOORE RAPID *Lectromelt*

CAPACITY TO SERVE!

WMC



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WESTERN METAL COMPANY

Smelters and Refiners of
Brass and Aluminum Ingots

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(*Concluded from page* 206)

probably courteous invitation—although on the latter item I may reserve judgment—I might reply that this train of thought was prompted by a reflection that probably has occurred to others, namely: One wonders why at times some foundries indulge in a campaign to bring young men into the foundry, are willing to spend money for courses of instruction that will prepare these young men for supervisory positions, and yet are willing in instances to dispense with the services of older men who already have all that skill and knowledge at their finger tips. Should not this and other similar wells of knowledge be utilized in some manner?"

Book Review

Manual of Principles and Procedures of Cost Accounting for the Malleable Iron Industry, published by the Malleable Founders' Society, Cleveland, spiral bound paper, 37 pages, 8½ x 11 in. Price $5.

The manual provides a chart of accounts for the segregation and accumulation of costs by productive departments and their cost centers, by service departments, and by general cost divisions. Factors for the distribution of costs to individual patterns are recommended. A definition of terms used in the manual is included.

The manual was written by the society's cost accounting committee: R. N. Cole, Canton Malleable Iron Co., Canton, O., chairman; R. C. Adams, Eastern Malleable Iron Co., Naugatuck, Conn.; Gordon Nash, Albion Malleable Iron Co., Albion, Mich.; R. G. Parks, National Malleable & Steel Castings Co., Cleveland; A. C. Sinnett, Benton Harbor Malleable Industries Inc., Benton Harbor, Mich.; Max Traum, Newark Malleable Iron Works, Newark, N. J., and John A. Wagner, Wagner Malleable Iron Co., Decatur, Ill.

ASTM To Meet

American Society for Testing Materials will hold its 53rd annual meeting at Haddon Hall, Atlantic City, N. J., June 26-30. A large number of technical papers and reports, including several symposiums, will be presented. During this week the ninth exhibit of testing apparatus and related equipment and the society's biennial photographic exhibit will be in progress. The 1950 Marburg Lecture will be given by Dr. Wallace R. Brode, associate director of the National Bureau of Standards, who will speak on spectroscopy as allied to testing and analysis of materials.

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At Lowest Cost

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SOLVAY SALES DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N.Y.

CORE GASES

(*Continued from page* 87)

explained later.

While the mold (Figs. 1 and 2) is being filled, the metal pressure at location *L* increases from *A* to *C* in Fig. 3 and remains constant for the period that the metal is in a liquid state, *C* to *E* in Fig. 3. As the metal becomes more viscous and finally solidifies, the resistance offered to penetration increases rapidly. Under the conditions assumed by the lines in Fig. 3, the pressure in the core does not exceed the pressure of the metal at location *L*. Consequently, gases from the core will not penetrate the metal in the casting.

As represented in Fig. 4, the rate at which the gas pressure builds up in the core is greater than that shown in Fig. 3, and at a certain time the gas pressure in the core is higher than the pressure created by the head of metal on the core. This condition, which causes some gas to be forced into the metal, is indicated by the intersection of the gas pressure line *A-G* with the metal pressure line *A-C-E-F* in Fig. 4. A situation of this kind may result from pouring very hot metal which produces a rapid evolution of gas in the core, and also causes the metal to remain in a liquid state for a longer time, *C* to *E* in Fig. 4.

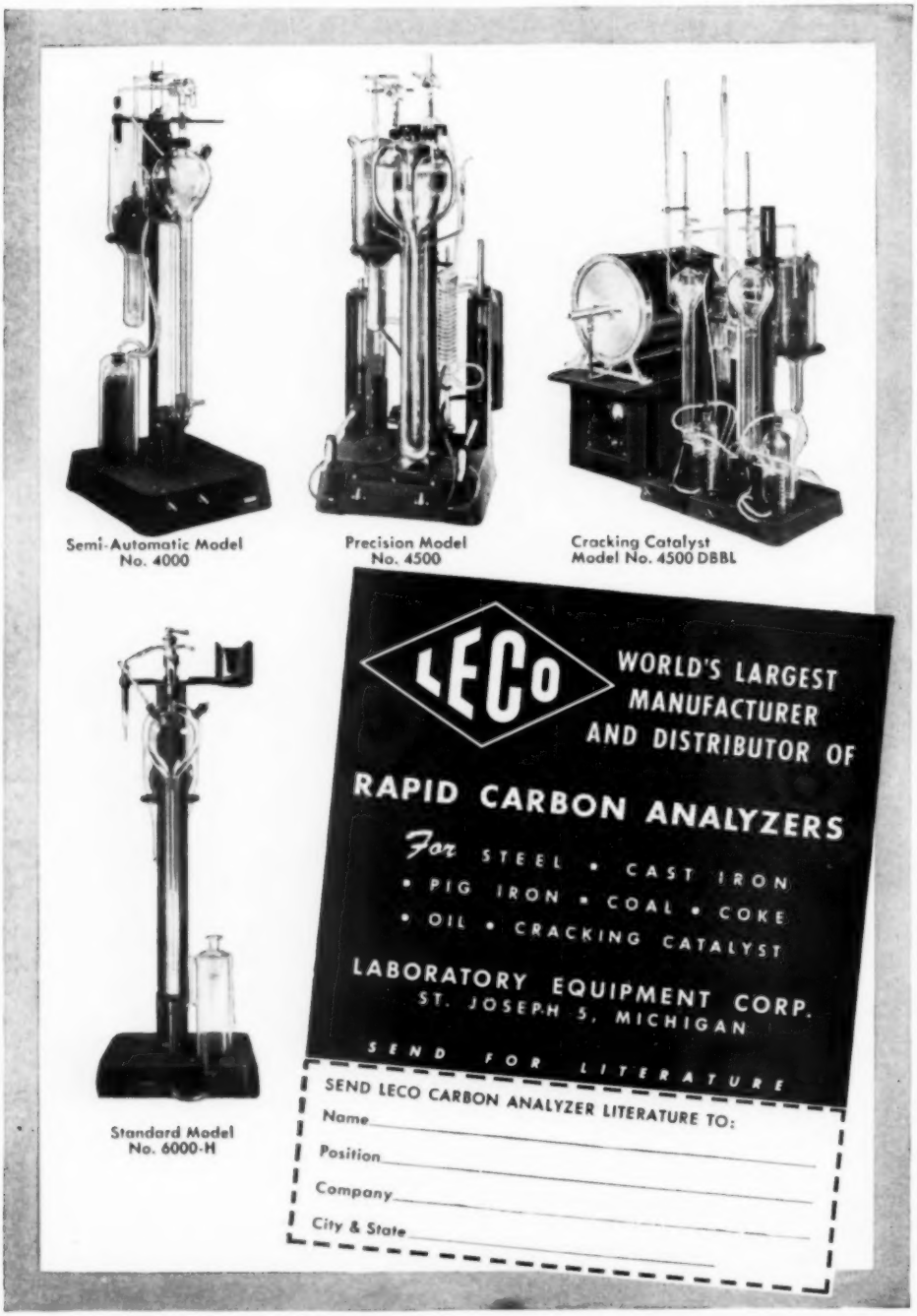
Ways to Prevent Gas Holes—One way to resist the penetration of gas from the core into the casting is to increase the pressure of the metal on the core. This can be done by raising the height of the sprue; this increases the head of metal on the core. With this change, as illustrated in Fig. 5, the pressure of the gas in the core is represented by *A-G* and the pressure of the metal by *A-D-E-F* in Fig. 6. Under these conditions, the pressure of the gas in the core does not exceed the pressure of the head of metal at any time; hence the core gases will not be forced into the metal.

Defects caused by gas cavities in metal castings are often the result of using core mixtures having insufficient permeability. This property depends to a large extent upon the grain distribution of the core sand. The larger and more uniform the grain sizes, the higher will be the permeability. The aim should be to use as coarse a core sand as is consistent with the finish required on the castings. Some core sand unavoidably gets into the molding sand, and may cause rough mold surfaces if the core sand is too coarse. Permeabilities of core sand mixtures can be readily determined, and on the basis of this information the most favorable mixtures can be selected.

Some core binders which are very soluble in water are carried to the surfaces of cores during the baking period. Apparently the hot vapors in passing from the interior to the outside of the cores transfer these binders to the surfaces. With the organic binder concentrated at the surfaces, large volumes of gas are produced rapidly when these cores are exposed to the molten metal. On the other hand, those binders which do not migrate, but remain on the sand grains throughout the cores, produce a lower rate of gas formation when the molds are poured.

In the previous discussion it was pointed out that the rate at which gases are produced from cores is most significant. Any conditions which will retard or reduce the evolution of gas will aid in obtaining sound castings. Cores not thoroughly baked are a prolific cause of excessive amounts of gas when molds containing these cores are poured. Any

(*Continued on page* 212)



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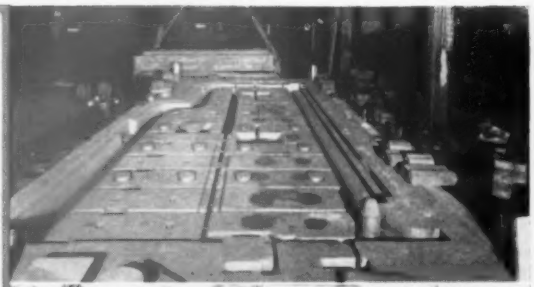

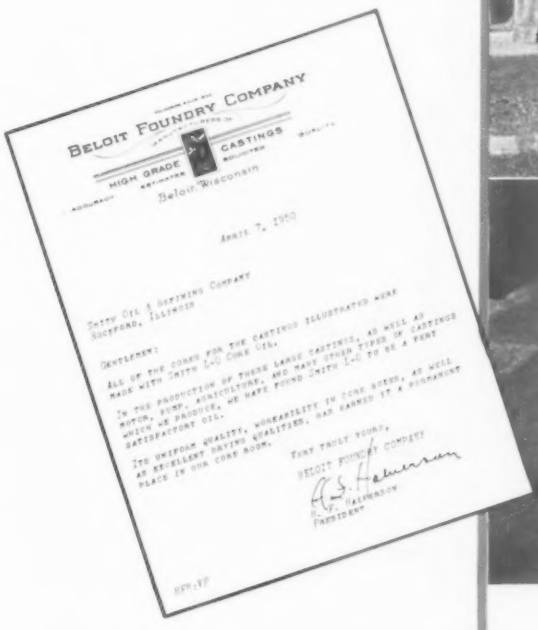
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(*Continued from page* 210)

moisture remaining on the surfaces of cores is changed almost instantaneously into vapor on exposure to the heat of the metal. In addition to the residual moisture from the core mixture, some moisture may be picked up from the atmosphere in which the cores have been stored.

The reactions involved in the normal baking of cores bonded with linseed oil cause the formation of gases from the binder. This evolution of gas continues until the cores are completely baked. If oil-sand cores are not thoroughly baked in the ovens, the heat from the metal in the molds will cause the development of excessive amounts of gas.

Size of Cores — The smaller the core, the more care should be taken to provide adequate venting for the removal of gases. To explain this requirement, consider two cores of spherical shape, one having a diameter of 1 in. and the other a diameter of 4 in. Both cores are made from the same mixture, are completely baked, and are exposed to the heat from molten metal at the same time. The smaller core has an area of 3.14 sq in. and a volume of 0.52 cu in. The larger core has an area of 50.24 sq in. and a volume of 33.49 cu in. Assuming that the volume of gas evolved amounts to M cu in. per sq in. of the area of each core, then 3.14 M cu in. of gas will be produced from the smaller core and 50.24 M cu in. of gas will be produced from the larger core. But this gas is liberated into the interstices between the sand grains in each core. Therefore the relative gas pressures developed in these cores are in the ratio of 3.14 M/0.52 to 50.24 M/33.49 or 6.0 to 1.5. This example shows that the pressure of the gas would rise four times as fast in the smaller core as in the larger core. To avoid defects resulting from gases, special attention should be given to the venting of small cores.

Gases from Core Binders — Gas forming characteristics of the different materials used as binders of core sand vary considerably. The results of an investigation to determine the amounts of gas produced from certain core binders are presented in Table I. To provide a basis for comparing the relative gas forming properties of these materials, the results are reported in terms of cubic inches of gas per cubic inch of core per pound of transverse strength developed by the binder. Standard transverse core specimens 1 x 1 x 8 in. were prepared on the transverse core maker from mixtures containing the different binders. After the specimens were baked under favorable conditions, they were tested on the transverse core tester. A sample equivalent in weight to ½-in. of the core specimen was placed in a boat which was inserted in a porcelain tube mounted within an electrically heated oven. A temperature of 1650° F was maintained within the heated tube. The gases generated from the binders were collected and measured in a water-jacketed burette after the moisture was separated in a condenser. The apparatus used in generating and measuring the gases from core binders is shown in Fig. 7.

Summary—In the formulation of core mixtures, in the baking of cores made from these mixtures, in the preparation of the molds, and in the pouring of these molds, precautions should be taken to avoid the possibility of gases from the cores being forced into the metal, thus causing defects in the castings. For those designs of castings which require interior cores having limited facilities for the removal of gases, special care should be taken in the selection of core sands to insure adequate permeability in the cores. Furthermore,

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those binders which produce relatively small amounts of gas per unit of strength should be employed. All cores should be thoroughly baked, should be kept dry, and should be placed in green sand molds just before pouring.

TIN BRONZE CASTINGS

(*Continued from page* 95)

down hill, the previous explanations of solidification will apply, with top pouring most likely to produce sound sections.

Fig. 5 shows a series of tapered sections gated in various ways. In 5A and 5B, cast big end up, the horizontal dotted line indicates the extent of the casting, the sides of which are continued upward to provide a tapered riser. In 5C and 5D, the taper is reversed or big end down. The tops of the latter mold cavities are, however, provided with risers having the same taper as the big-end-up molds. These risers are necessarily smaller across in comparison with the thickness of the castings.

The mold shown in Fig. 5A is arranged for top pouring into the bottom of the riser. If this casting is poured slowly, we should obtain the necessary directional solidification even with little taper. On the other hand, if this mold could be filled with metal instantly, so that all metal within the mold was at the same temperature, this metal would still begin to solidify at the lower end because of the thinner section at this point, the solidification extending upward.

As there should always be liquid metal above the solidifying metal, this liquid metal should force itself between the solidifying dendrites, provided again that atmospheric pressure is available at all times upon the metal surface. If the riser remains open until the metal has completely solidified up to the top of the casting, then the casting should be perfectly sound. A deep shrinkage cavity should exist in the riser, the volume of this cavity being almost equal to the volume of the liquid-solid shrinkage of the metal in the casting plus that in the riser. The riser is cut off at the dotted line, leaving the casting free from shrinkage porosity.

An additional thought should be introduced here; it may have considerable bearing upon other requirements of the cast part. The first metal to solidify at the bottom of the mold cavity will be comparatively fine grained because of the rapid cooling in the thinner portion of the mold. The metal immediately above, solidifying more slowly because of the larger cross section, will have somewhat larger grains. The grain size will increase as we approach the upper part of the casting and will be coarsest at the top where the cooling is slowest. With large tapers, there may be a considerable differential in grain size between the bottom and the top of the casting.

We can usually obtain sound castings by providing sufficient taper, but if this is resorted to in sections of large expanse, we may obtain such large grains that the physical properties of the casting will suffer, large grains giving lower strength and ductility. Most large-grained castings made of tin bronze have a tendency to increased leakage under pressure. It is not known for certain, however, whether this leakage results from the large grains in themselves, or from the interdendritic shrinkage which usually is more prevalent with large dendrites, especially if final solidification has occurred after the riser has frozen over or if other conditions were present which were conducive to causing shrinkage porosity.

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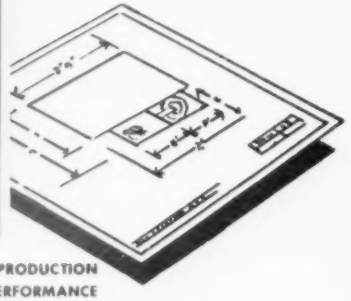

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The author has seen sufficient large-grained bronze castings—made under carefully controlled conditions as regards feeding—which showed no signs of leakage under high pressures, even after the chilled skin was removed, that he is inclined to believe that leakage, when found, is due, not directly to large grains, but to shrinkage porosity resulting from insufficient feeding of these heavy sections. Care should be taken, however, to provide only that amount of taper necessary to feed the particular section under consideration, and thus avoid excessive grain growth which might lower the physical properties below those specified.

Coming to Fig. 5B, we have the same casting as shown in 5A except that it is bottom gated. Under these conditions, the metal will cool as it enters the mold, this cooler metal remaining on the surface. By the time that the mold and the riser have been filled, the coldest metal will be in the riser and the hottest metal at the bottom of the mold. Under ordinary conditions, the colder metal at the top would freeze first and cut off feeding completely from the hotter metal below. Such a condition would invariably result in more or less shrinkage in the lower portion of the casting.

There is some hope, however, provided the casting is poured quickly enough to fill the mold completely with metal of nearly uniform temperature throughout, thus permitting selective freezing from the bottom up, the taper providing the necessary directional freezing. Here again we must retain the riser in a molten condition until the complete feed demand has been met.

A sound casting can also be produced with slower pouring if we increase the taper, making the top sufficiently large that the metal at this point cannot possibly freeze before solidification has proceeded from the bottom. By a very carefully controlled pouring procedure, it is possible to pour this casting without fast pouring, without providing excessive taper, without shrinkage and without large grains. If all conditions are correct, the grain size will be almost uniformly fine throughout the casting. But this requires very close control of the temperature and the rate of pouring. The temperature must be low to permit rapid freezing once solidification has started, yet sufficiently high that all metal remains molten until the mold has been filled. The pouring speed must be such that, when the mold is filled, the metal at the bottom will be at the temperature where immediate freezing is initiated, which freezing proceeds rapidly upward.

Hot Metal in Riser

Added to these conditions, the riser must be hot, either by suitable insulation, by outside means of heating, or by pouring hot metal into it as soon as the mold cavity has been filled to or slightly above the riser junction. As already stated, this method will produce a sound casting with uniformly fine-grained structure and hence excellent physical properties. The chief disadvantage is that all conditions must be kept under such close control that it is not generally considered practical in the ordinary production foundry.

In Fig. 5C, we see a still worse condition, where the large portion of the casting is at the bottom and tapers toward the top. Here we can expect a certain amount of sound metal, comparatively fine grained at the bottom, with shrinkage near the top as the result of feeding being shut off at the narrow section at the bottom of the riser or a short

(*Continued on page* 216)

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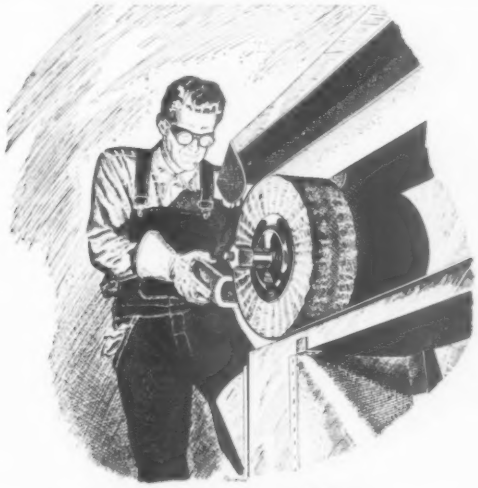

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(*Continued from page* 214)

distance below. Even here it is possible to obtain comparative if not complete soundness if we pour very cold metal very slowly, thus initiating progressive feeding from the bottom regardless of the disadvantageous taper. But here again, the conditions must be controlled very closely, much more closely than is ordinarily considered possible in production work.

Fig. 5D illustrates a condition which should be assiduously avoided in any mold as it cannot help but cause shrinkage. The metal, entering the mold at the bottom, cools as it rises and leaves the coldest metal at the smallest section, which also is the point from which feeding must come; and the hottest metal is at the point having the largest cross section which would naturally be the slowest to cool. The first thing that will happen will be complete solidification at the narrow neck at the bottom of the riser, immediately shutting off all feeding. Inevitably we will get a large amount of shrinkage extending throughout the castings, but probably heaviest in the lower bulky and heavier section.

The discussion so far will probably appear rather elementary to most readers. Peculiarly, however, the author has noted numerous cases where procedures have been employed, the use of which can be productive only of unsoundness in the resulting castings. It is probable that no really experienced foundryman would purposely cast the piece shown in Fig. 5D in the manner illustrated. It is suggested then that we examine some of our more complicated castings. There is a fairly good chance that we will find numerous examples of areas which are molded very similarly to the worst examples shown, but were overlooked as these areas were overshadowed by other, apparently more complicated, areas, or perhaps no way could be developed to gate and riser such areas by any other method. The fact remains, however, if at any point in any casting, we use gating methods indicated above as bad examples, we will probably have shrinkage at that point.

Casting Is in Parts

Any large and complicated casting can be considered as being made up of a number of simple smaller sections, each of which will be similar to the castings illustrated in the first five figures, with some curved sections added to complicate the problem. If we could consider each of these sections separately, molding them and pouring them in the way to produce optimum results, there should be little or no difficulty in obtaining sound castings every time. It is when we try to put the separate parts together into a single complicated casting and try to pour them all at once—from one ladle of metal and through a single gate—that we get into trouble. It is for this reason that these simple sections have been discussed.

From this point, it is intended to go on and derive methods of putting these simple shapes together in such a way that the rules known to all may be applied, using these approved rules wherever possible or using ways to get around apparently impossible situations where such circumvention may be necessary. Every apparently hopeless situation so far described can be cast without shrinkage, not necessarily by the method of gating and risering shown, but by other methods which will be developed and discussed. Unfortunately, we cannot consider every design in an article like this or even in a large number of such articles. Furthermore, we cannot make successful combinations

(*Concluded on page* 218)

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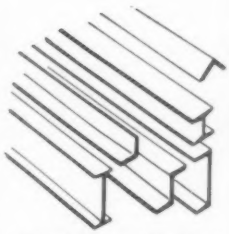
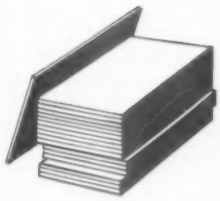


STRUCTURAL SHAPES



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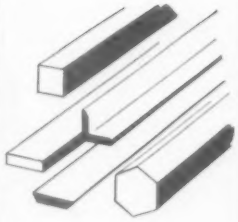

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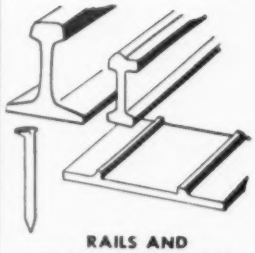

RAILS AND TRACK ACCESSORIES

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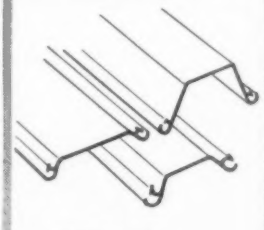

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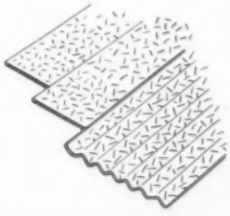

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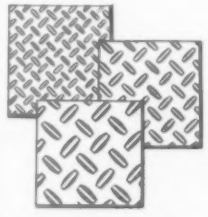

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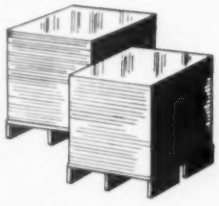

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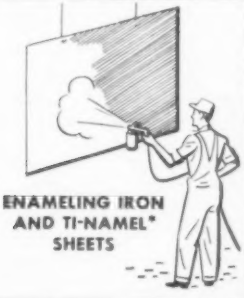

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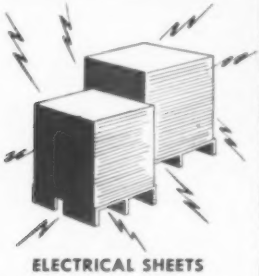

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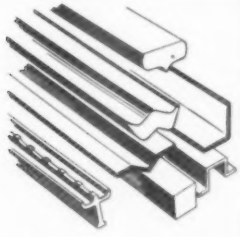

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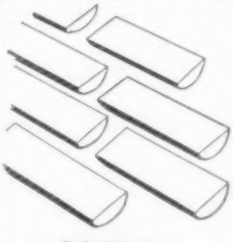

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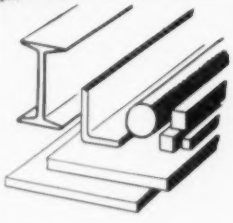

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(*Concluded from page 216*)

of all the simple designs considered, especially in the manner that most designers combine them. We can, however, state a few general principles which have been derived so far:

(a) Mold with heavy sections uppermost, insofar as possible.

(b) Use top pouring whenever practicable.

(c) Pour slowly in most cases.

(d) Pour at a sufficiently low temperature to obtain optimum solidification characteristics.

(*To be continued next month*)

GRAY IRON

(*Continued from page 99*)

keel block mold is so designed that the legs, or coupons, are perfectly fed, and tensile specimens machined therefrom are free from shrinkage. This type of test bar shows the true properties of a cast material in its best physical condition. Tests on one heat of nodular iron were made with standard 0.505-in.-diameter steel type tensile bars machined (a) from keel block coupons and (b) from vertically cast 1.20-in. diameter test bars (A-48 bar B). See Table I for particulars.

It is well known that cast steel also shows a decrease in tensile properties, especially ductility, when specimens are machined from sections with even minute centerline shrinkage. Flinn and Chapin[8] showed comparative tests of a flake graphite gray iron (TC 3.66; Mn .94; P .10, S .06; Si 1.82; Ni 1.52; Mo 1.06) with a perfectly fed keel block type specimen versus a specimen cut from a 1.20-in.-diameter standard test bar. Tensile stress-strain curves of .505-in.-diameter specimens from both specimens showed that the centerline shrinkage in the 1.20-in. test bar decreased the strength by about 22 per cent and the elongation by 50 per cent. The effect of centerline shrinkage shown in Table I, therefore, is not a characteristic of nodular iron alone but applies as well to cast steel and to flake graphite cast iron.

Nodular Iron Test

The type of tensile specimen commonly used for testing malleable iron has been used for nodular iron also. This specimen is cast to size and usually fed from both ends so that when the risers are cut off, the annealed bar may be tested without machining. The feeding characteristics of nodular gray iron are different from those of the white iron for malleable castings and present indications are that the malleable bar may have to be redesigned to give consistent and representative tests with nodular graphite cast iron.

The tensile-hardness relation for nodular iron more nearly approaches that for steel than for gray iron. Fig. 5 shows the approximate range for steels (several sources) and for gray irons (from Fig. 10) with several individual tests on nodular irons plotted in the same chart. Note that where the irons are incompletely nodular the tensile-brinell ratio is lowered toward the range of flake graphite irons.

One strength value for flake graphite irons which correlates well with hardness is the compressive strength. In Fig. 6 are plotted values from the 1933 Impact Report[5]. ASTM E-256 standard compression tests were performed on a few nodular cast irons. Compressive strengths are rather indeterminate in ductile materials and in these tests the end point was taken as the load where observable bulging of the specimen had occurred. It is obvious that in compressive strength the nodular iron is not superior to flake graphite iron as it is in tensile strength.

In carrying out tests on 10-in.-diameter pipe cast of gray iron and of

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nodular iron it has been observed that while the nodular pipe has two to three times the bursting strength of the gray iron pipe, collapse tests show little difference in the two materials. A collapse test on pipe is just the opposite of a bursting test in that hydraulic pressure is applied to the outside of the pipe instead of to the inside. The collapse test is really a compression test and in both materials collapse strength is nearly proportional to the hardness.

It has been observed also that in transverse testing of nodular graphite iron test bars, failure sometimes initiates at the top or compression side of the bar. In this case a V-shaped chunk is squeezed out from the top of the bar under the load. This type of failure is never seen in flake graphite iron. These examples indicate simply that while in flake graphite iron the compressive strength may be three times the tensile strength, in nodular graphite iron the compressive strength and the tensile strength are of the same order of magnitude (as in steel).

Conclusion—

1. Increasing section size and increasing carbon equivalent tend to lower the strength values and the hardness of gray cast irons.
2. Inoculated irons are more consistent and predictable as to the effect of section size.
3. The position of an iron in the tensile-brinell chart affords an indication of the graphite form and distribution.
4. A high ratio of tensile strength to hardness gives the greatest toughness as measured by impact testing.
5. Properties of nodular graphite cast irons are best evaluated by transverse tests with complete stress-strain curves or by tensile tests on specimens from keel block coupons.
6. Nodular graphite cast irons have tensile-brinell ratios much higher than flake graphite irons and approaching the range of steels, but the compressive strength-brinell ratio is of the same order whether nodular or flake graphite.

References

1. Schneidewind & Hoenicke—"A Study of the Chemical, Physical, Mechanical Properties of Permanent Mold Gray Iron," *Proceedings*, ASTM, Vol. 42, 1942.
2. Talbot & Richart—"A Study of Properties of Cast Iron Pipe," *Proceedings*, ASTM, Vol. 26, 1926.
3. MacKenzie & Donoho—"A Study of the Effect of Span on Transverse Tests of Cast Iron," *Proceedings*, ASTM, Vol. 37, 1937.
4. Krynitski & Saeger — "New Method of Measuring Deflection in Transverse Test of Cast Iron," *Bulletin*, ASTM No. 97, 1939.
5. "Impact Testing of Cast Iron," *Proceedings*, ASTM, Vol. 33, Part 1, 1933.
6. MacKenzie, J. T.—"The Brinell Hardness of Gray Cast Iron and Its Relation to Some Other Properties," *Proceedings*, ASTM, Vol. 46, 1946.
7. *Steel Castings Handbook*, Steel Founder's Society of America, 1941, page 142.
8. Flinn & Chapin—"Ductility and Elasticity of White and Gray Irons," *Transactions*, AFS, Vol. 54, 1946.

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New EQUIPMENT and Supplies

For Additional Information on these Items Use Reply Card—Page 223

(1)—Hydraulic Vise: Columbian Vise & Mfg. Co., 9017 Bessemer Ave., Cleveland, 4—Hydraulic vise holds castings for cleaning. Operator uses both hands to lift and position casting into vise, then by pushing the foot pedal closes the front jaw to hold casting in position. Maximum gripping pressure between the jaws is about 6000 psi. A safety valve protects against overloading. It is claimed that jaws can be closed without crushing or marring light casting or finished surfaces. The vise stays locked until release pedal is pushed. Vibration caused by an air hammer is said not to loosen the jaws.

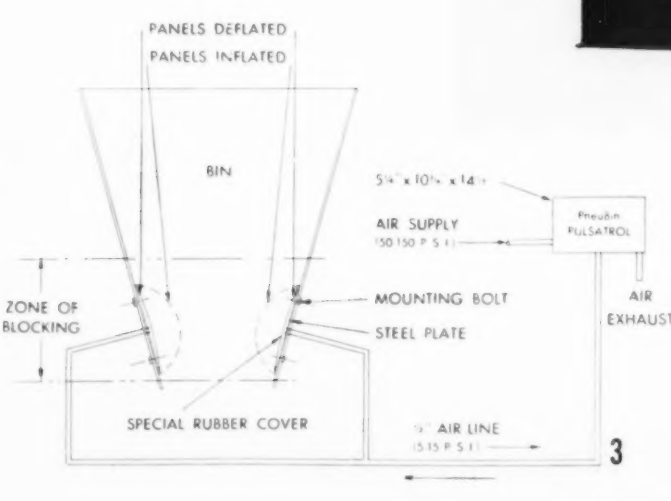
For More Details Circle No. 1—Page 223

(2)—Air Compressor: Ingersoll-Rand Co., 11 Broadway, New York 4—New line of packaged-type, heavy duty electric-driven compressors range in size from 125 to 350 hp for continuous full load service and two stage compression to 80-125 psi discharge pressures. The new "L" design embodies a single vertical low-pressure compressor cylinder, a horizontal high pressure cylinder, and a synchronous motor mounted directly on the crankshaft. Air enters and leaves the compressor through main air connections on the frame, and is led to and from both cylinders and intercooler through large passages within the frame itself. The packaged intercooler fits entirely within the same frame. Counterflow, tube-and-finned construction of the intercooler is said to provide good cooling with very little pressure loss and a small quantity of water. Compressor is said to require a small foundation and a minimum of maintenance.

For More Details Circle No. 2—Page 223

(3)—Material Pulsator: Gerotor May Corp., Dept. E, Baltimore 3— Pneumatic device mounted on the inside walls of bins or hoppers is designed to keep materials moving by positive displacement, thus preventing arching, funneling and tunneling. Flexible covers for the panels are made of reinforced, abrasion-resistant rubber. Air flow to and from the panels is automatically regulated, permitting selection of a wide range of pulsation frequency, force and amplitude. The unit is said to have direct action on bin contents rather than on the bin and to permit closed bin tops and bin storage of materials previously considered impossible to feed from bins. Unit is applicable to all types of bins and hoppers and is said to be easily installed and to give quiet, vibrationless operation.

For More Details Circle No. 3—Page 223



(4)—Air Blast Moisture: Foxboro Co., Foxboro, Mass.—New device is designed to provide measurement of cupola blast air moisture directly in terms of dew point, and in conjunction with electronic recorders and recording controllers, can be used for recording and controlling the dew point of blast air. The unit consists of a tube containing a thermometer bulb. The tube is wrapped with a lithium chloride impregnated woven glass tape and wound with two silver wires. A low voltage applied to these wires causes current to flow through the lithium chloride solution, thus generating heat and warming the unit to the equilibrium temperature. The equipment controls the addition of moisture to blast air to maintain a constant moisture content higher than atmosphere, by controlling automatically the input of steam or water spray to the blast line. For dehumidifying operations the equipment is used to vary, automatically, the adjustments of the dehumidifying apparatus, to maintain the dew point value required.

For More Details Circle No. 4—Page 223

Scoop-Shovel: Yale & Towne Mfg. Co., Roosevelt Blvd. & Haldeman Ave., Philadelphia 15—Hydraulically operated scoop-shovel is designed for attachment to the company's electric and gas fork trucks for operation within the plant, in the plant yard, and in box cars and highway truck trailers. The scoop handles up to 27 cu ft of material. The device scoops at the ground level or digs into piled material. It tilts upward from the horizontal scooping position to cradle the load during transport, and tilts downward to discharge the load into receptacles at heights up to 130 in.

For More Details Circle No. 5—Page 223

Bucket Loader: Barber-Greene Co., 631 West Park Ave., Aurora, Ill.—Bucket loader will handle up to 3 cu yd per minute of bulk materials. Automatic load trimming is made possible with a power hydraulic-controlled swivel loading conveyor. Swivel conveyor is offered in 13 ft, 7 in. or 16 ft, 7 in. lengths. The solid plate elevating boom is mounted on a tractor type pneumatic-tired chassis. The unit has two forward and two reverse speeds, with maximum road speed of 15 mph. Steering is through a truck type worm and roller.

For More Details Circle No. 6—Page 223

Grinders: Master Pneumatic Tool Co., Orwell, O.—Two new models of short type, heavy-duty, air-powered grinders have been added to the company's line. Model M-612 has a 1-in. spindle projection, threaded ⅜-in.-24, weighs 3 lb, 6 oz, and is 9 13/16-in. long. It may be fitted with a ⅛-in. or ¼-in. collet for use with carbide and high-speed rotary files, as well as mounted abrasive points or a ½-in. collet for using round abrasive sticks. Straight type grinding wheels and cone or plug shaped wheels are mounted directly on the spindle. Model M-613

Mold Blowing Machine Has High Production Rate

NEW mold blowing machine developed by International Molding Machine Co., West 31st St. & Belt Railroad, La Grange Park, Ill., is designed to produce, automatically, 350 half molds per hour. A circular turntable, about 72 in. in diam, has pins protruding upward from its surface to hold five metal pallets at equally spaced intervals around the table. Special pattern plates fit into recesses in these pallets. Pattern plates may be removed from the pallets and the pallets removed from the turntable simply by lifting them off. No tools are required, and all five patterns can be changed in 30 seconds, it is claimed.

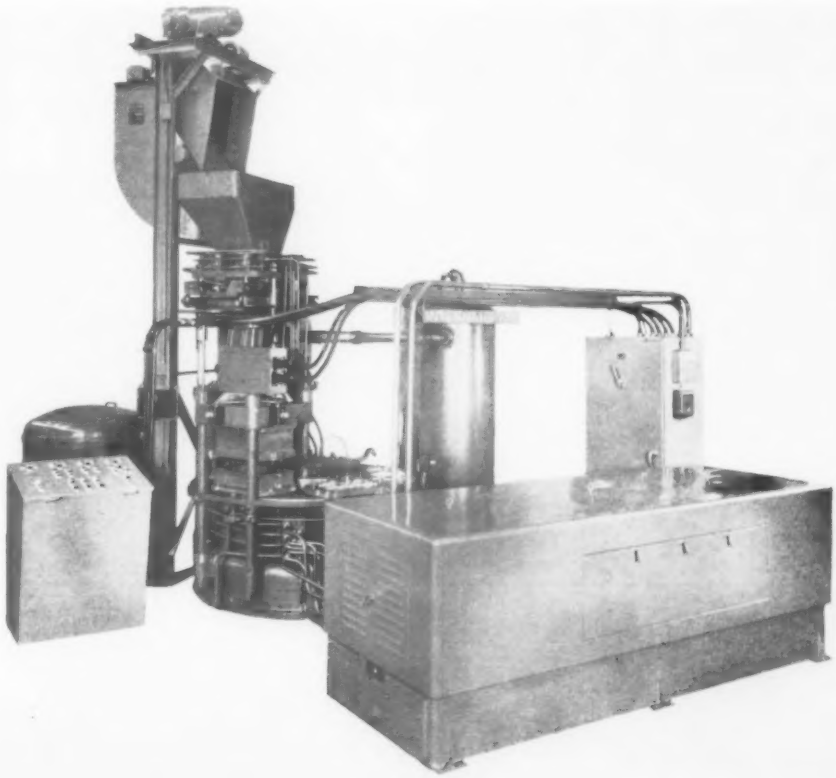
In operation, a flask is placed over a pattern on one of the pallet boards mounted on the turntable. The table indexes at the various stations of mold production, bringing the flask first to the filling station where standard mix molding sand is blown into it. At the next station the flask of sand is squeezed to the correct mold hardness. The table indexes again and the pattern automatically is vibrated as a pin pushup draw operation is performed. The pins hold the mold high, allowing it to be removed from the machine.

All operations are automatic and are performed simultaneously as subsequent flasks move into position. Two positions always are empty, allowing for cleaning and spraying the pattern, for placing inserts into the pattern, and for setting on new flasks.

This machine is designed to handle 12 x 18-in. flasks. All mechanical movements are hydraulically actuated; minor clamp cylinders and blowing operations are operated by compressed air at line pressure. Cycling of the machine is performed by electrical controls, and proper safety factors are incorporated in the electric circuit to assure safe operation.

In the accompanying photo the control panel is shown at the left. The mold blowing machine is in the left background. In actual production a larger sand storage hopper (top of machine) would be used, and it would be fed by a plate feeder or belt conveyor. A compressed air storage tank is in the right center background, and the cabinet of electrical apparatus is at right. Cabinet housing hydraulic pumps and storage tank is in the foreground.

For More Details Circle No. 7—Page 223



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has a 7/16-in. spindle projection, threaded ⅜-in.-24, weighs 3 lb, 4 oz., and is 9¼ in. long. This model is most generally used with the ⅛-in. and ¼-in. collets for the same applications as model M-612, but where a shorter model is preferred.

For More Details Circle No. 8—Page 223

Fork Truck: Clark Equipment Co., Battle Creek, Mich.—Gasoline-powered, 10,000-lb capacity fork-lift truck has Dynatork drive as standard equipment. It transmits engine power through a magnetic field, across an air gap, eliminating need for any type of friction clutch. The conventional transmission also is eliminated, and replaced by constant mesh forward and reverse gearing. Advantages claimed for the drive are increased work capacity for the machine, higher efficiency, reduced maintenance, minimum driver fatigue and improved all-around performance. Specifications of the machine are: Length 107 in.; wheelbase 66 in.; width 50½ in.; outside turning radius 104 in., and inside turning radius 12 in. The engine develops 50 hp at 1800 rpm.

For More Details Circle No. 9—Page 223

Lighting Unit: Midwest Lighting Products Co., P. O. Box 536, Edgewater Branch, Cleveland 7—New lighting unit has a permanently silvered reflector designed to provide a wide area of focused brilliant illumination for industrial lighting. The unit has a spun alumi-

(*Continued on page* 226)

HELPFUL LITERATURE

50. Materials Handling Truck

Kalamazoo Mfg. Co.—4-page illustrated bulletin No. KT-1 describes Kal-Truk materials handling truck powered by 13-hp 2-cylinder air cooled engine and having capacity of 2/3-yd or 3000 lb. Supplied with all steel dump body as standard, it can be equipped with interchangeable steel platform.

51. Foundry Dust Control

Aquadyne Corp.—Seven illustrated file folders and 12-page booklet deal with applications of Aquadyne Wet Water system for controlling dust in manufacturing industries, foundries, mines and ceramic tile plants. In addition, system can be used to treat water for fire fighting.

52. Molding Machines

Davenport Machine & Foundry Co.—Illustrated bulletins Nos. 1005, 1001, 1002, and 1003 and form No. 1100 describe model A totally-enclosed jolt rollover draw molding machines, model No. 40-SA jolt rollover draw machines, model AJ-16 plain jolt units, model 24 AJS portable jolt stripper pin-lift machine, and automatic air oiler for lubrication of pneumatic tools, respectively.

53. Graphite Briquettes

United States Graphite Co.—4-page illustrated bulletin on Mexite Briquettes explains how graphite materials can be used for carbon control in the cupola. Their use supplies steady source of graphitic carbon and provides means of raising carbon and reducing chill, shrinkage and hardness.

54. Plastic Patterns

Plastic Corp. of Chicago—4-page illustrated folder "Now Plastic Patterns Are a Practical Reality!" deals with Plastiplate plastic which is especially suited to duplication of broken aluminum patterns, master patterns, cope and drag sections, matchplates or core boxes of wood, metal or any other material.

55. Sand Recovery System

National Engineering Co.—4-page illustrated bulletin 504 portrays batch-type sand Decarbonizer which is most successful on oil, resin and cereal bonded sands. Also available is 4-page illustrated bulletin 492 which concerns Porto-Muller portable mixer for all types of foundry sand and which has capacity of 250 to 300 lb.

56. Industrial Dust Control

American Wheelabrator & Equipment Corp.—4-page illustrated bulletin No. 262 depicts use of Dustube collectors in the metal industry. By recovering dust at source and filtering it from air stream, system provides better working conditions, closer quality control and improved production.

57. Exhausters

Clarage Fan Co.—28-page illustrated catalog No. 701 presents heavy-duty steel plate fans suitable for use in practically any type of exhaust system handling air or other gases at temperatures up to 700° F. They can be furnished with any of several types of wheels which are interchangeable after installation.

58. Overhead Cranes

Northern Engineering Works—8-page illustrated bulletin HL-115 contains descriptions of representative electric overhead traveling cranes built in any capacity for any size of building. Operating features of line are discussed and uses in variety of plants depicted.

59. Crucibles & Refractories

Joseph Dixon Crucible Co.—28-page illustrated catalog "Dixon's Crucibles & Refractories" presents data on standard graphite, tilting, bottom pour, self-skimming, aluminum melting, induction furnace, Carbond carbon bonded and other types of crucibles as well as melting bowls, stirrers and skimmers, base blocks, stoppers and nozzles, and silicon-carbide refractories.

60. Cast Steel Flasks

West Michigan Steel Foundry Co.—4-page illustrated circular "Cast Steel Flasks" discusses and shows variety of cast steel flasks which are furnished completely machined and equipped with hardened pins and bushings ready for service. Facilities for production of carbon and low alloy steel castings are shown also.

ADDITIONAL INFORMATION?

For additional information on any of the items described under "New Equipment and Supplies", "Trade Publications" or "Helpful Literature" in this issue — simply circle their corresponding item numbers on one of these cards.

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61. Grinding & Polishing

Behr-Manning — 8-page illustrated form No. 714 depicts how Metalite cloth belts have facilitated backstand grinding and polishing operations when used in conjunction with modern contact wheels. Typical examples are given of backstand conversion installations throughout various industries.

62. Materials Handling Machines

Maquoketa Co.—2-page illustrated leaflet "The Best Helper in the Plant" is descriptive of models 301 and 302 bulk materials loaders and 1000-lb capacity fork truck and stacker. All units are hydraulically controlled.

63. Vertical Dust Suppressor

Whiting Corp.—4-page illustrated bulletin FY-162 gives features of Hydro-Clone compact vertical dust suppressor for general industrial control where extremely heavy loadings of dust are involved. Available in capacities from 2000 to 40,000 cfm, unit provides efficient wet suppression of dust and reduces it to easily disposable sludge.

64. Springs & Formed Wires

Colorado Fuel & Iron Corp., Wickwire Spencer Steel Div.—28-page illustrated manual is entitled "Springs & Formed Wires." It depicts and describes extension, compression, torsion and flat wire springs as well as variety of formed wire shapes.

65. Unit Type Dust Collectors

Aget-Detroit Co.—4-page illustrated pamphlet No. 610 is designed to speed selection of correct size unit type dust collectors for any industrial dust problem requiring from 200 to 3600-cfm capacity.

66. Socket Screws

Parker-Kalon Corp.—16-page illustrated form 490 contains data on high tensile alloy and stainless steel socket screws and complete list of standard sizes for each type. Information on stripper bolts, pipe plugs and hex keys is included also.

67. Industrial Metals

Continental Copper & Steel Industries, Inc.—48-page illustrated brochure entitled "Metal for Industry" traces history of company and its organization, describes various manufacturing divisions and their facilities for industrial fabrication, and lists many publications available to foundrymen.

68. Flask Bushings & Pins

Universal Engineering Co.—8-page illustrated catalog F1016 and attached price list cover precision machined, hardened and ground flask pins and bushings for use in cast-iron, steel or aluminum flasks. Having stability and accuracy to provide register of cope and drag for hundreds of castings, units are available in several sizes of round, elongated, press fit and other standard types.

69. Dust Collectors

American Wheelabrator & Equipment Corp.—4-page illustrated circular No. 262 depicts methods of using dust control to improve working conditions and quality, reduce maintenance costs and provide more efficient production on such operations as grinding, blast cleaning and saw glazing.

70. Belt Conveyor Systems

Transall Inc. — 4-page illustrated pamphlet "Out of the Hills and Far Away" discusses construction features of belt conveyors for handling coal, rock, slag, sand, gravel, ore and any other bulk material. Dimensions and prices are listed for troughing and flat belt idlers having 4 and 5-in. steel rolls.

71. Molding Machines

Adams Co. — 12-page illustrated catalog No. 705 depicts and presents specifications of side rod and post type jolt and universal jolt squeezers, hand squeezers and accessories such as pneumatic rappers, vibrators and knee valves.

72. Radiographic Materials

Eastman Kodak Co.—16-page illustrated catalog "Materials & Accessories for Industrial Radiography" discusses films for use with x-ray equipment of varying kilovoltage and with specimens of varying thickness and density. Information on relative speeds and contrast of different emulsions is charted.

73. Nodular Cast Irons

Cerium Metals Corp.—12-page publication "The Production of Nodular Cast Irons with Cerium—Some Practical Details" explains practice of adding cerium to foundry melt, as developed by British Cast Iron Research Association.

74. Unit Heaters

Modine Mfg. Co.—Illustrated folder "Modine Unit Heaters" describes cabinet type unit heaters, horizontal delivery models featuring direct pipe suspension, vertical delivery types for direct downward heat delivery and Power-Throw heaters having high velocity for blanketing large doorways with heat.

75. Compounded Fluxes

Atlantic Chemicals & Metals Co.—6-page illustrated circular "Immunitas Products" discusses line of compounded fluxes which do not absorb moisture from air, do not smoke and do not create fumes. Products for aluminum, brass and bronze, zinc and other metals and alloys are outlined.

76. Heat Processing

Selas Corp. of America—12-page illustrated bulletin S-1.1 is concerned with industrial heat processing techniques which utilize radiant gas burners that beam high temperatures to materials at speed of light. Applications for this system include continuous tinplate fusion, annealing metal and glass, and baking enamels.

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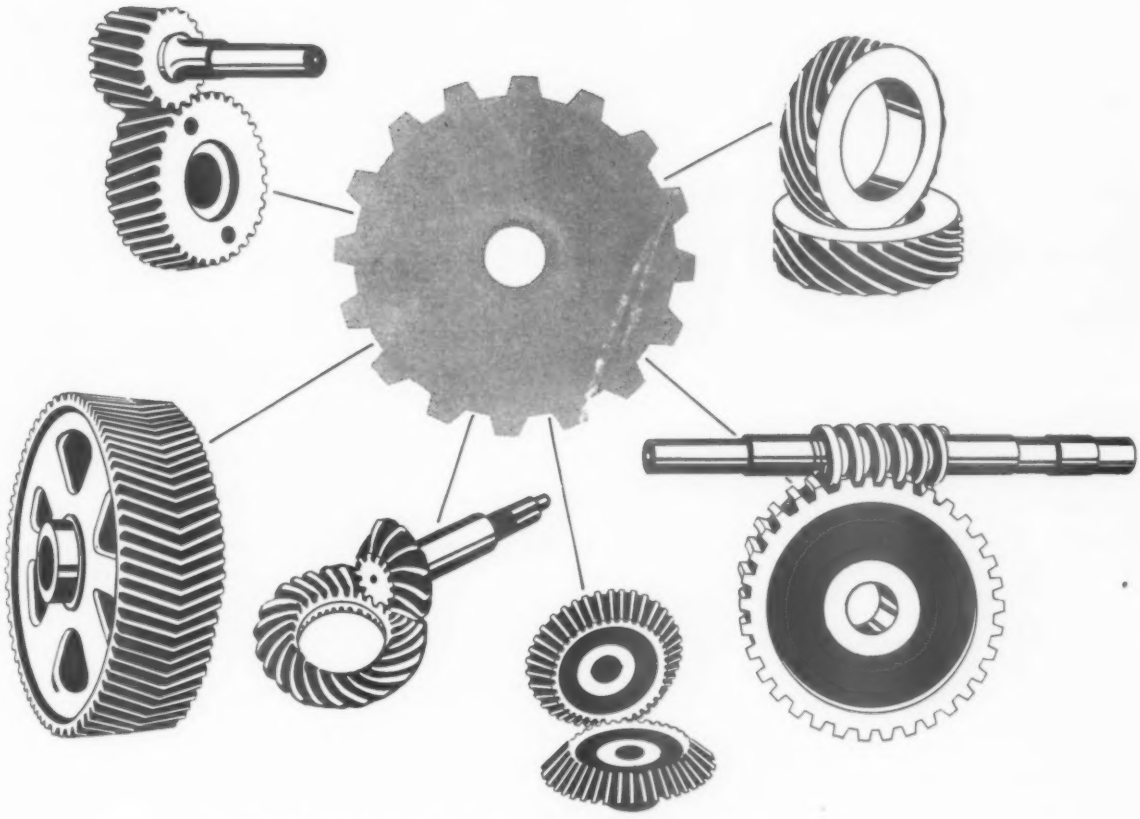

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American Smelting and Refining Company, 120 Broadway, New York 5, N. Y.

(*Continued from page* 222)

num housing. Fittings are cadmium plated and are ½-in. standard. Diameter of the unit is 17 in.; its height is 20 in., and weight is 8 lb. A feature is the hand blown clear glass reflector. Highly reflective silver plating is spun-coated to the facet-designed inside of the double walls of the reflector. Blue daylight silver-plated glass reflectors also are available. The unit uses a 750 or 1000-w incandescent or 400-w mercury lamp.

For More Details Circle No. 10—Page 223

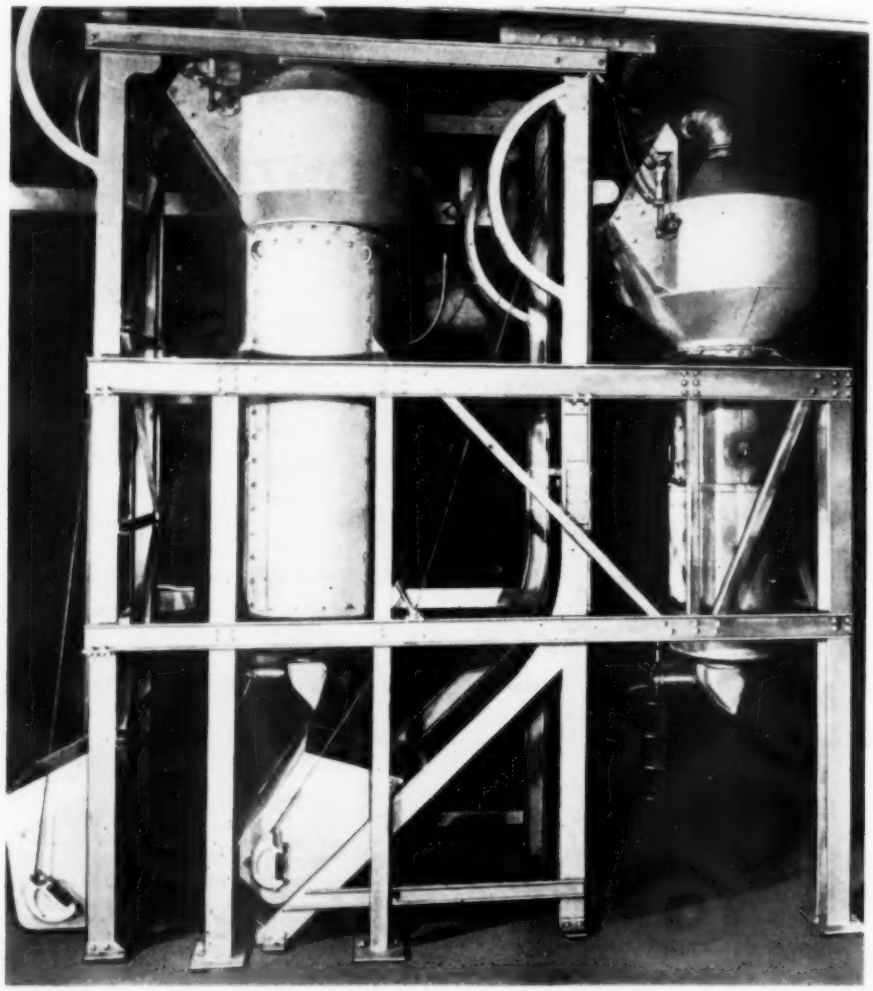
Develops New, Compact Unit for Sand Reclamation

NEW sand decarbonizer is designed to supply reclaimed sand of physical characteristics equal to new sand. It is a batch unit governed by a timer for continuous operation and is the product of National Engineering Co, 549 West Washington Blvd., Chicago 6.

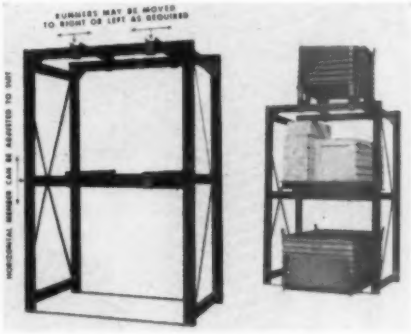
The unit shown here is said to deliver an 800-lb batch of sand every 12 minutes. The used sand is charged into the bucket loader at extreme left in the photograph, which starts the automatic cycle by dumping the sand into the reaction chamber. Air at approximately 1700° F is introduced into the chamber through a central tube and enters the sand at the bottom. The permeation causes the sand to "boil," allowing very intimate contact between the sand and the heated air. Carbonaceous materials are burned off, and the scrubbing action also assists removal of waste. Sand is discharged through a valve at the bottom of the reaction chamber into the waiting bucket loader at lower left center of the photo.

This loader elevates the sand to the cooling chamber, which is similar in construction to the reaction chamber in that cooling air is forced down through a central pipe, permeating the sand. The clear, processed sand then is discharged ready for reuse in the foundry. Included in the unit are two dust collectors—one for the reaction chamber and the other for the cooler. A control panel with push buttons for manual operation is supplied. Oil or gas may be used to heat the air used in the reaction chamber.

For More Details Circle No. 11—Page 223



Storage Rack: Palmer-Shile Co., 16033 Fullerton Ave., Detroit 27—Adjustable storage rack for platform boxes and pallets permits storage of several boxes or pallets of various sizes. Adjustability of tracks up or down is advantageous as a safety measure in the storage of uneven loads. Track channel runners are adjustable to any width. Units



are manufactured to required dimensions. Paint and number of track and runners may be specified.

For More Details Circle No. 12—Page 223

Trailer Wheels: Aerol Co., 2820 Ontario St., Burbank, Calif.—Heavy-duty industrial trailer wheels and casters are designed primarily for use on power-towed equipment. Available in rigid and swivel casters, they are cast of aluminum alloy. Features include sensitive swiveling action, sealed-in lubrication, and a permanently adjusted kingpin of 1¼-in. chrome molybdenum steel. Rubber tread on the wheels is said not to chip, gouge, or adopt a permanent set, and the tread contour and shore hardness are intended to minimize rubber displacement under load. Wheels are permanently sealed and lubricated. The casters and wheels are available in four different mountings — caster mount, inside mount, outside mount, and stub axle.

For More Details Circle No. 13—Page 223

Instrument Mount: Eberbach & Son Co., 200 East Liberty St., Ann Arbor, Mich.—Vibration damping, nonmagnetic base is designed for mounting delicate mechanical, optical or electrical instruments. It protects them from vibrations with frequencies as low as 10 cycles per second. The base measures 12 x 22 in., weighs 50 lb, and is 2½-in. thick. A ½-in. threaded insert at the rear center of the top enables the user to mount an entire apparatus assembly. An anodized aluminum support rod is available as an accessory. The platform is of heavily reinforced concrete and has a black

(*Continued on page* 228)

The *practical* answer to complex foundry problems...

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ALL FOUNDRIES are faced with problems in production, plant layout, methods, facilities, equipment or personnel at one time or another. But few foundries have qualified men who have the time (in addition to their regular duties) to thoroughly analyze the problem, initiate a plan and follow it through to a successful conclusion.

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These experienced engineers can be of real help to you, regardless of your problem, large or small. Call the Knight Chicago or New York office for immediate attention.

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(*Continued from page* 226)
wrinkle finish; it is mounted on four shock absorbing units.
For More Details Circle No. 14—Page 223

Drop Hook: Coffing Hoist Co., Danville, Ill.—Safety drop hook is said to be capable of lifting, hauling and easily releasing any weight within its capacity as simply as a man

handles a 1-lb weight. The mechanical hook, using toggle action, has a 6000-lb capacity, weighs 2¼-lb and requires a 40-lb pull on the release lever to release the 3-ton load. When released, the jaws automatically remain in the open position for reloading. Side plates of the hook are made of special aluminum alloy. The load bearing hook and internal cams and levers are of high-tensile steel. The hook is said to lock securely at all times until load is released.
For More Details Circle No. 15—Page 223

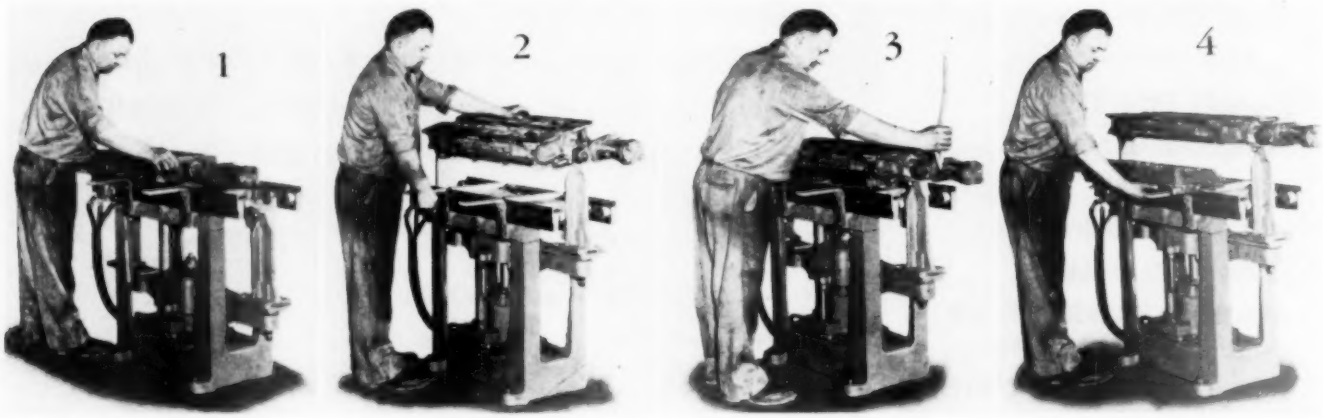
Hydraulic Control: Reeves Pulley Co., 1225 Seventh St., Columbus, Ind.—New hydraulic control for use on the company's variable-speed motor drive is designed to provide automatic speed changing. The actuating force is secured by connecting the control valve lever to any speed indicating mechanism on the driven machine. Pressure of only a few ounces is said to produce changes in output speeds. The control lever directs flow of oil into the cylinder, which in turn regulates the position of the piston. Movement of the piston changes the effective diameter of the driving pulley and, therefore, the output speed of the motor drive. The same control without the hydraulic power plant is available for pneumatic operation.
For More Details Circle No. 16—Page 223

Drilling Machine: Sibley Machine & Foundry Corp., 206 East Tutt St., South Bend, Ind.—Medium weight drilling machine has the following features: Swing of 25 in., variable speed drive from which the exact spindle speed may be obtained for any size drill from ⅛-in. to 1 in., and a rectangular 18 x 26 in. table with coolant trough. Machine is powered by a 1½-hp motor and has a capacity of ¾-in. holes in steel and 1 in. in cast iron. Five options of spindle speeds, each with a 4:1 ratio, are available, ranging from a low of 206-825 rpm to a high of 540-2160 rpm.
For More Details Circle No. 17—Page 223

Fork Lift Truck: Buda Co., 154th and Commercial St., Harvey, Ill.—Two new fork lift truck models of 2000 lb capacity are rated at a 24-in.

load center for greater lifting capacities which permit handling loads of 2220 lb at 20 in. and 2600 lb at 15 in. load center. Such design changes as a new steering axle, new style solid carriage plate, redesigned forged forks, adjustable cushion operator's seat, larger diameter steering ties, and interchangeable masts are incorporated in both the cushion tire model shown here and the pneumatic tire
(*Continued on page* 230)

Core Drawing Machine Is Designed For Use with Any Type Core Blower



CORE drawing machine developed by SPO Inc, 6448 Grand Division Ave., Cleveland 5, designed to perform one complete core draw cycle in 18 seconds, is suitable for operation with any type core blower. The unit can be used singly, in pairs for double shuttle operations, and in circular conveyor systems handling high production. The core box is positioned by parallel sets of dust-tight ball bearing rollers and guide rails. After the core plate is clamped into place, the core box is lifted pneumatically for manual roll over. Core plate supports on the machine bed are then positioned and core box is lowered. Removal of plate clamps permits the box to be drawn automatically for core removal and subsequent handling operations in the production cycle.

The machine is built at a 32-in. working height for ease of core box handling and positioning as well as core plate removal. Individual machines can be furnished on order to meet specific height of core blowers. The new machine is air powered at standard 80 psi line pressure and will handle core boxes ranging from 24 to 36 in. long.

The accompanying illustrations show: 1. Worker positioning core box. 2. Core box in raised position, rolled over, and core plate supports being positioned. 3. Core box lowered, clamps removed. 4. Core box drawn and core being removed from machine.

Operating cycle requires from 18 to 42 seconds, depending upon the type and size of cores and the number of cores in box.
For More Details Circle No. 18—Page 223

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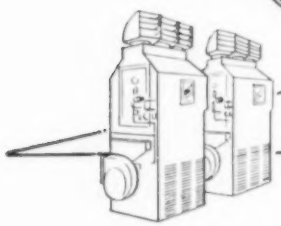


THEY INSTALLED DRAVO HEATERS

THEY SAVED

$4,372.00 PER YEAR

*Rosedale Foundry and Machine Company, Pittsburgh, Pa.

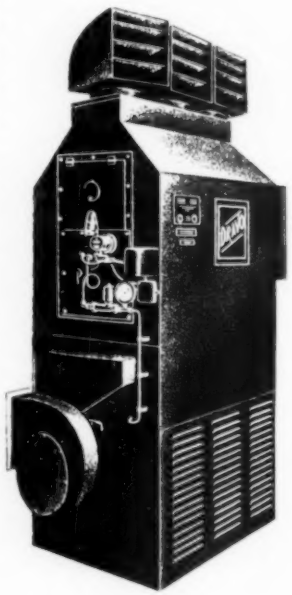
Like many other metalworking plants, Rosedale, producers of Meehanite Metal castings, depended for years on salamanders for heating. Everyone *assumed* that any more modern method would cost too much, and probably couldn't heat the high-roofed, metal structure much better anyway.

But no one was happy about the situation. Coke and labor were big cost items. Production was lost while men "thawed out". Air was smoky and sulphurous.

So Rosedale investigated, and found (1) that Dravo *Counterflo* Heaters could do the job for LESS cost than salamanders, (2) that Dravo was already heating many similar structures with complete satisfaction, and (3) that Dravo Heaters would help clear up the polluted atmosphere.

Result: four Dravo *Counterflo* Heaters were installed, eliminating 39 salamanders. Yearly cost-reduction is $4372. Even with 25% annual amortization, this company is currently saving $500 a year. After four years the investment will be completely written off, and the entire saving will be velvet. The indirect savings—improved production, greater employee comfort, elimination of coke fumes, and saving in floor space—are extra dividends. Everybody's happy about the heating now.

No one can afford, today, to put up with old-fashioned, inadequate heating equipment—any more than to use old-fashioned production machines. Let us review your heating problems, and provide you with some specific examples of the savings Dravo *Counterflo* Heaters are making for others—and that they can make for you. Consult your classified telephone directory for the name of the local representative—or write us direct.



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(*Continued from page* 228)

model. Standard mast of the trucks has a collapsed height of 64½ in. with an 85-in. lift; however, a variety of lifting heights are available. Trucks are equipped with 15-hp engines and have two speeds forward and two speeds reverse with maximum speed of 10 mph. One hydraulic control is used to tilt, raise or lower the mast.

For More Details Circle No. 19—Page 223

Protective Coating: Dampner Co. of America, Hyde Park, Boston 36—A protective coating which utilizes the characteristics of silicone resins, has been developed for weather-exposed service at temperatures to 750° F. The aluminum pigmented coating is formulated to withstand either continuous exposure to heat or intermittent heating and chilling, and all conditions of weather exposure, as well as chemical-fume attack. Its high spreading rate is said to permit rapid and easy application by brush or spray to any reasonably well-prepared iron, steel, galvanized, or other metal surface. Recommended coverage is 1000 sq ft per gal. Drying time is ½ to 3 hr.

For More Details Circle No. 20—Page 223

Sieve Shaker: Syntron Co., 540 Lexington, Homer City, Pa.—Vibrating test sieve shaker for laboratory screen analysis work operates quietly on 110 v ac. Vibrating action is produced by electromagnet drive. There are no bearings, gears, belts, or pulleys, and no lubrication

is required. Amplitude of vibration is regulated by a rheostat located in the front of the base cabinet. A reset timer provides accurately timed test periods. Shaker is mounted on three adjustable feet that permit leveling to the spirit level on

the base rim. Nested sieves are locked in place by pulling down the handle located at the top of the unit. Sieves are removed by pushing the handle up, releasing the locking pressure.

For More Details Circle No. 21—Page 223

Leather Hand Pads: General Scientific Equipment Co., 27th & Huntingdon Sts., Philadelphia 32—

Horsehide hand pads, adjustable to any size, have new snap-fastened straps to keep pads on workers hands and permit easy removal. They are cool and comfortable and designed for maximum protection.

For More Details Circle No. 22—Page 223

Refractory: Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh—Lightweight refractory with high strength and insulating values weighs 56 lb per cu ft. The lightweight castable is said to have a thermal conductivity 65 per cent less than that of high-duty fireclay brick. Good strength and volume characteristics are claimed throughout the product's entire working temperature range, and it may be used safely in temperatures up to 2000° F. Further claims are that the refractory is plastic and workable, and can be cast in place, troweled or gunited with equally good results.

For More Details Circle No. 23—Page 223

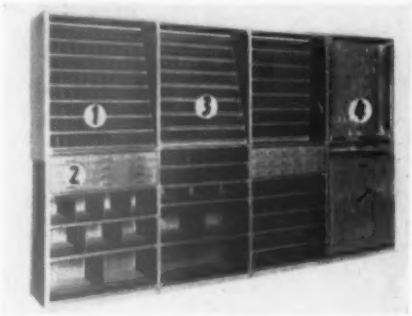
Vibrator Kits: Cleveland Vibrator Co., 2789 Clinton Ave., Cleveland 13—Packaged vibrator kits, consisting of a pneumatic vibrator, a control valve, and an air line lubricator, have been developed to meet the requirements of a wide range of materials handling applications. Kits also contain nipples and connectors necessary to permit rapid, easy attachment of the vibrator assembly to hoppers and storage bins, having capacities from one to several hundred tons. Any one of six standard company vibrators can be furnished in a kit. Speeds of operation for the vibrators, computed on line pressure of 80 psi, range from 2100 to 750 vibrations per minute. Operating speed can be regulated by varying the line pressure.

For More Details Circle No. 24—Page 223

Lift Trucks: Automatic Transportation Co., 149 West 87th St., Chicago—Engineering changes have been made in 12 models of the company's sit-down electric fork lift trucks. They include trucks ranging in capacity from 1000 to 4000 lb. Among the changes are: Addition of 2 in. of lift has been made to the trucks involved except for Shipper models. Skylift BF models now tier to 132 in. with no change in the collapsed mast height of 83 in. All electrical controls have been placed in a completely enclosed panel on the dashboard. New controller makes it impossible for the operator to reverse the truck before it comes to a stop. A larger seat has foam rubber padding and adjustable back rest. Self-adjusting packing has replaced the chevron type, making disassembly of the ram unnecessary when making adjustments for wear. A heavier piston rod has been introduced.

For More Details Circle No. 25—Page 223

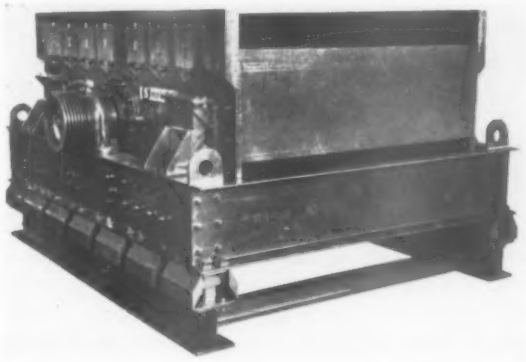
Tool Rack: Lyon Metal Products Inc., P. O. Box 671, Aurora, Ill.—Redesigned tool rack offers complete storage facilities for tool rooms and stock rooms. Fig. 1—Sloping front unit provides 88 open-



ings in eight depths with shelf dividers adjustable every inch for storage of small tools and supplies. Fig. 2—Drawer case unit with five dividers in each drawer. It is useful for small tools and cutters supplies. Fig. 3—Sloping shelf unit has 108 compartments on eight shelves for storing drills, reamers, and taps. Fig. 4—Swinging panel unit with holes punched every inch allows almost 27 sq ft of storage area. It is useful for milling cutters, gages, and templates.

For More Details Circle No. 26—Page 223

Rubber Mountings Reduce Shakeout Shock



SHEAR type rubber mountings at the base of a shakeout and shown along the lower left side of the 5 x 8-ft model illustrated here have been successful in reducing, considerably, the periodic shock transmitted to a concrete backaround apron where this type shakeout is installed at Crucible Steel Casting Co., Cleveland. The city of Cleveland made tests of this installation on a Brush Development oscillograph recorder. The setting was 0.001, deflection 15 mm. Shakeout load was approximately 8 tons. Oscillations recorded were as follows, deflections being given as gross: Before installation of the mountings, maximum periodic deflection was 16.35 mm; maximum periodic averaged deflection was 14.77 and maximum periodic low deflection was 10.22 (no load.) After installation of the shear rubber mountings, the values were 6.13, 5.63 and 3.03 mm, respectively. These figures include the average factory deflection of 1.25 mm.

The following results were calculated after deducting the factory deflection. 1. Maximum continuous periodic deflections were reduced to 32 per cent of former shock series. 2. Average continuous periodic shocks were reduced to 32 per cent of previous shocks. 3. The present maximum periodic shock with load is 54 per cent of previous shock without load.

Mountings were developed by Simplicity Engineering Co., Durand, Mich.

For More Details Circle No. 27—Page 223

The UTILITRUC 10,000-lb FORK-LIFT TRUCK

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Clark announces the Utilitruc-100—a 10,000-pound-capacity gasoline-powered fork-lift truck added to its steadily-growing line of materials-handling machines and attachments.

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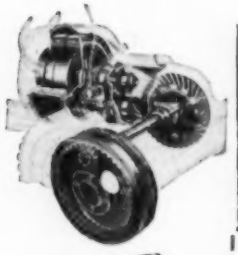

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Core and Molding Sands

(*Continued from page* 101)

the conditions are not too severe, steel penetration and sand adherence at such points are thus completely prevented.

For small cores in heavy sections of steel, however, or for re-entrant angles where very heavy sections join, alumina-cement mixtures have been found ineffective, severe and complete penetration readily taking place at such portions of the mold. In these cases the casting was generally scrapped, because while penetrated silica sand is bad enough in all conscience, penetrated alumina is absolutely appalling.

As pointed out by Goodale (loc. cit.) penetration must be largely a capillary phenomenon. No one, to the author's knowledge at least, has remarked that in capillary glass tubes, liquids are repelled rather than drawn in, if they do not wet the surface of the glass, and that it is probable that the same is true in the case of the penetration of silica or alumina molds by liquid steel—only when the metal *wets* the refractory material will it readily penetrate the pores of the mold. Possibly iron oxide on the surface of the metal may promote the wetting of the sand grains by the steel, once the mold is heated high enough to start the combination of silica and iron oxide. Alumina, with its higher melting point would resist penetration longer, and the iron oxide would be concentrated in the surface layers of the mold. When heated high enough and long enough, however, the alumina is heavily penetrated by the steel, perhaps because of the formation of compounds that make the metal wet the mold material and be drawn even into the extremely minute pores of a mixture with a permeability value of 2.

Types of Sand—Because of the cost of moving sand from the pits to the foundry, it is generally necessary to rely upon nearby sources of supply, so that the foundryman is somewhat limited in his choice of sand types. Generally, however, he is able to choose between the three main classes, which as listed in AFS *Sand Testing Handbook*[9], are:

(1) Naturally bonded sands, containing appreciable percentages of clay-bonding materials. (Briggs[10] gives the limits as 5 to 15 per cent AFS clay). (2) Crude silica sands, containing 1 to 2 per cent, or in some cases slightly over, of clay-bonding material.

(Briggs gives the limits as from just under 1 to 5 per cent AFS clay.) (3) Sands containing no clay-bonding material, or from which the clay-bonding material has been removed; the latter are known as washed sands.

As already indicated, in most American steel foundries the naturally bonded sands formerly so popular are no longer used as the chief molding material. Instead, either crude silica sand or washed sand, of the desired grain distribution types, is blended with binder of appropriate kinds, to produce mixtures with the correct properties. The deposits of naturally bonded sands have to a considerable extent been exhausted, so that in order to secure the desired proportions of clay and the specified grain distribution or AFS grain fineness number, producers of naturally bonded sands are often obliged to blend sands from several different parts of their properties, or obtained at different depths below the surface.

Held to Close Limits

The requirements of the foundries, too, are much more severe than in former years, so that it is harder to produce material that meets their specifications. Foundrymen today expect to hold the clay and moisture content of their sand mixtures to much closer limits than they formerly did, and it is not easy, if even possible, to keep the percentage of water in naturally bonded sands as shipped within satisfactorily close limits. The necessity of maintaining a stock for consumption in winter, when the naturally bonded sands are apt to freeze in transit and give trouble in unloading, also militates against their use.

As explained above few clays are even nominally free from fine particles of silica and in many cases this contamination attains large proportions This is particularly true of the clay substance in naturally bonded sands. These silica particles do not have the bonding power of true clay, so that for a given percentage of bonding material the strength of naturally bonded sands is lower than that of synthetic mixtures containing selected clays of high bonding power. To a certain extent, to be sure, this lower strength is offset by the fact the clay substance in the naturally bonded sands is more evenly distributed over the silica grains than is usually the case in synthetic mixtures.

The fine silica particles in the naturally bonded sands, too, are more

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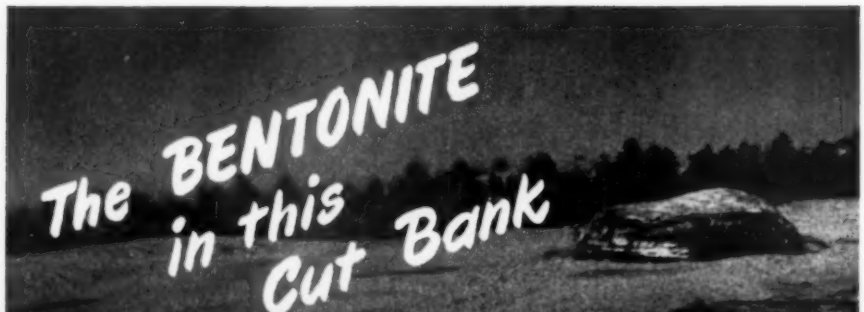

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or less the equivalent of the silica flour often intentionally added to the artificially bonded sands, and as they are bought at sand prices, they cost less. It is sometimes economical, therefore, to use naturally bonded sand to form a part of a synthetic mixture, instead of going whole-hog and adding the necessary materials to crude silica or washed and dried sands. In following this practice, however, it is harder to obtain exactly the desired properties and uniformity in the mixture, because there is no easy way to determine the exact proportions of true clay and of fine silica particles in the naturally bonded material.

Naturally bonded sands are sometimes said to be workable over a wider range of moisture content, to dry out less rapidly, and to be easier to finish and patch, than synthetic mixtures. They also require much less mechanical equipment, since carloads of naturally bonded sands can be unloaded and sent into the foundry with no more than a quick mulling to mix in binders of the molasses type, or even be unloaded directly to the sand heaps

Prefer Synthetic Sand

Because of the fine silica particles mixed with the clay of naturally bonded sands, synthetic mixtures are usually more refractory, have the better permeability and flowability, and require less water for a given degree of workability. It is said, too, that the naturally bonded sands are less durable, but the evidence on this point is not really conclusive.

When using synthetic sand mixtures, either crude silica sands containing a small amount of clay or washed and dried sands may be employed. The clay in the crude material, though not of as high grade as regular bonding clays, gives the sand a certain amount of green and dry strength, and therefore enables the foundryman to secure the properties he desires, at less expense than when using clay-free sands. The crude sands, however, are seldom as uniform in grain size as the washed and dried sands, which are sent through classifiers to eliminate the grains coarser and finer than the desired sizes. In some cases only the crude sands are used to make up the facing sand mixtures. Sometimes crude sands are mixed with varying proportions of the washed and dried material to secure the desired properties. The choice is usually influenced by the relative prices of the two types of sand and of clay or bentonite and silica flour.

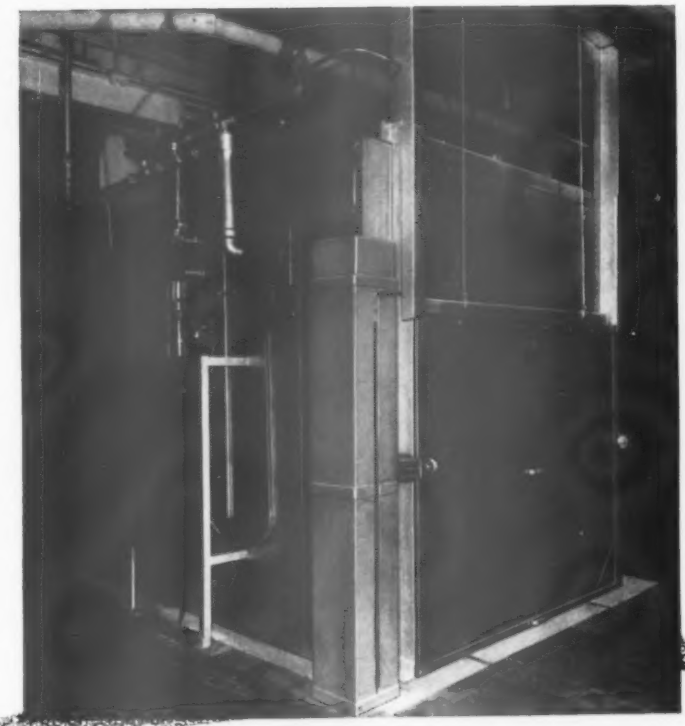
Clay and Bentonite—Clays used to bond synthetic sand mixtures are composed of one or more of the minerals kaolinite, illite, and montmorillonite, all of which are hydrous silicates of aluminum. Montmorillonite is the material known in the industry as bentonite, and is the end product of the weathering of certain types of volcanic ash. A small amount of it is also present in some of the clays that consist chiefly of kaolinite and illite. All clays are composed of minute crystalline flakes of the constituent minerals. As already mentioned, they usually contain also certain amounts of fine silica particles, and of iron oxide, calcite and the alkalies, soda and potash. The bonding power of clays varies widely, and is a function of the relative proportions of the several constituent minerals, of the particle size, and of what is known as the base-exchange capacity.

Factors Affecting Bonding Power

In general, the smaller size of the particles of the clay minerals, the greater the bonding power of the clay. The base-exchange capacity is of importance chiefly in montmorillonite. This mineral has the power of adsorbing on the surface of the crystalline flakes, sodium, calcium, or hydrogen ions, which greatly affect its properties. The kaolinite and illite clays have but little capacity to adsorb ions in this manner. The presence of considerable amounts of silica, calcite or coarse particles of the clay minerals lowers the bonding power.

In past years some foundries used raw lump clay because it could be bought at a low price. The difficulty of properly distributing it over the sand particles in the mullers, however, and the variations in the bonding power of successive shipments makes it advisable to use dried and ground clay, which is readily incorporated in the sand, and is usually of uniform quality. The clays in a given district, of practically identical geological origin, vary considerably from one pit to another, and even in different portions of the same working. Producers of bonding clay select their material carefully, and compound it so as to keep its properties as uniform as possible.

As there is no simple way to determine from analysis or physical examination what the bonding power of a clay may be, it is customary to determine this property by testing either the green or the dry strength of a mixture of a standard washed and dried sand with definite amounts



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of clay and of water, mulled under fixed conditions. Instead of a standard sand, a sample of the sharp sand used in the shop and kept on hand for the purpose, may be used. It is desirable to check the bonding power of each lot of clay received.

There is a marked difference between bonding clays composed of kaolinite or illite, and the montmorillonites known as bentonite. The latter, too, are of two distinct types, known respectively as western and southern. The western material occurs in extensive beds in the Black Hills of Wyoming and South Dakota, southern bentonite is mined in northern Mississippi. Both are composed almost wholly of montmorillonite, but in the southern type part of the aluminum is replaced by iron and the adsorbed ions are chiefly calcium, in contrast to the western product, in which the adsorbed ions are sodium. Because of these variations in composition, the properties of the two types are radically different.

Increase Green Strength

Western bentonite swells in water to 12 or 15 times its dry volume. Southern bentonite, like kaolinite and illite, swells very little. Both materials greatly increase the green strength of sands, but while sands mixed with western bentonite have very high dry strength, those in which southern bentonite is used are low in that property. At least until quite recently, only the western variety has been used in steel foundry work, though Dunbeck[11] has published data on the properties and uses of sands bonded with mixtures of the two kinds. In the present discussion only western bentonite is considered and for convenience it is referred to merely as bentonite and the kaolinite and illite materials as clay.

The strength, permeability and other properties of mixtures of sand, and clay or bentonite, are profoundly affected by variations in the amount of moisture present. In unbonded sands, the green permeability increases as the per cent moisture rises, up to about 1½ or 2 per cent, and steadily decreases with further additions. This is illustrated in Fig. 7, which summarizes the data obtained by Ash and Lissell[12] from tests of round grain and of angular grain sands, of several grain sizes. As already explained, for any given grain size, the angular grain sand has the higher permeability, and for any grain shape, the coarser the sand the higher the permeability. The dry permeability of two of the angular

grain sands is also shown in this chart. It will be seen that the dry permeability of the sands increases with increasing moisture up to a little under 1 per cent and is unaffected by further additions. The dry permeabilities of round grain sands of several different grain sizes were found to vary in exactly the same way. In order not to so complicate the diagram as to make it hard to interpret, these data are omitted from Fig. 7.

The permeability of sand-clay or sand-bentonite mixtures varies in much the same way as that of unbonded sands. When there is only a small proportion of bond, the green permeability rises as the moisture increases, up to about 1½ per cent, and decreases with further additions. With high proportions of bond, the maximum permeability occurs at about 4 per cent water. As the fine clay or bentonite particles fill the spaces between the grains of sand, the permeability is the lower, the higher the proportion of bonding material. Fig. 8, from an article by Briggs & Morey[13], shows the variations of green permeability in mixtures of washed silica sand of AFS 63 grain fineness number, and different percentages of bentonite and of water. When clay is used as a bonding material instead of bentonite, the permeability of the mixtures will vary in a similar manner.

Moisture Affects Strength

The green compression strengths of mixtures bonded with clay or bentonite also increase to a maximum as the water content is raised up to a certain amount, and decrease with further additions of moisture. With small percentages of the several bonding materials, the amount of moisture required to obtain the maximum green strength is in the neighborhood of 1 per cent or slightly over. As the proportion of the bonding material increases, the amount of moisture required for maximum strength rises. The strength also is greatly raised by increasing the proportion of bond. Grim and Cuthbert[14] give data showing that in the case of kaolinite the green compressive strength increases from 3 psi with 4 per cent bond and 1 per cent moisture, to 23 psi with 15 per cent bond and 3.5 per cent moisture. The figures for illite are quite similar. A bentonite content of 2 per cent at 1 per cent moisture gives a strength of 3 psi, and 15 per cent bentonite with a little over 4 per cent moisture produces a mixture with a green strength of about

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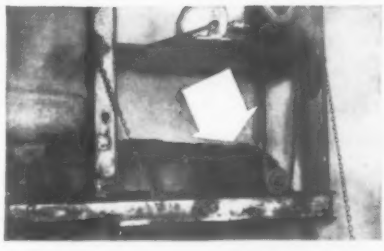

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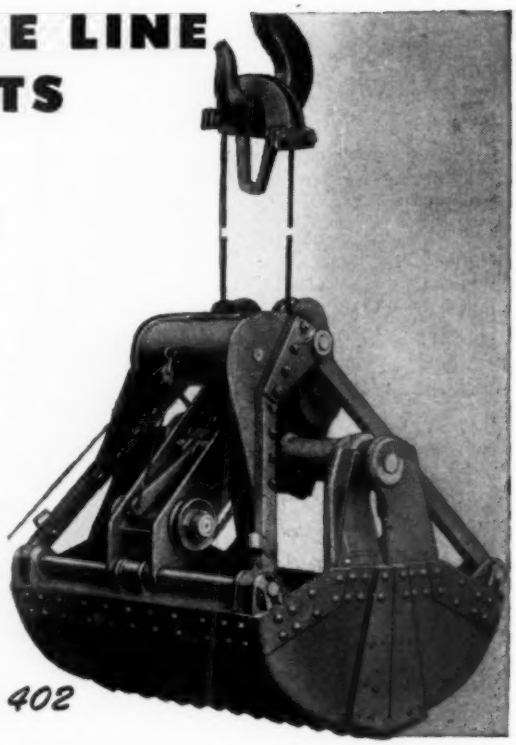

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31 psi. These data are shown in Figs. 9, 10, 11 and 12. The latter gives the maximum green strength developed by each of the three types of bond, and illustrates clearly the well known fact that the bonding power of bentonite is from 2 to 3 times as great as that of the kaolinite or illite clays.

Air Setting—With both types of bond, there is a considerable increase in the green compressive strength of mixtures that are allowed to stand in the air after ramming. Grim and Cuthbert give the figures shown in Table IV to illustrate this.

In the case of the kaolinite and illite, the increase in strength is more rapid, and the actual increase is greater, than in mixtures containing bentonite. This is because the water requires more time to penetrate completely between the tiny flakes of kaolinite or illite than in the case of montmorillonite. The strength of the latter as rammed, therefore, is more nearly a maximum than that of the kaolinite or illite mixtures.

As Briggs[15] points out, in clay-bonded sands the moisture migrates freely from place to place within the mold, whereas when bentonite is used, a wet spot next to a dry spot will remain wet for a long time. Bentonite-bonded mixtures dry out on the surface more rapidly than clay-bonded ones, since the moisture from underlying layers does not migrate freely to the surface to make up for water lost through evaporation. Consequently, when using bentonite, it is desirable to add other binding materials that decrease the rate of drying. This keeps the mold from becoming crumbly on the surface, hard to trowel and patch, and prone to wash as the steel flows over it.

The sintering point of bentonite is lower than that of clay, the fusing point of pure montmorillonite[16] being as low as 1800° F. However, as only about one-third as much bentonite as of clay is needed to give any desired strength, the sintering point of a mixture of sand and bentonite is usually lower than that of one composed of sand and clay. This is the more true because the amount of clay generally used is close to the proportion that produces a mixture of the lowest possible melting point, as shown by the silica-alumina melting point diagram, Fig. 6.

Of more importance than the differences in sintering points, are the variations in permeability in mixtures bonded with clay and with bentonite. The fine particles of the

bonding material, filling up the openings between the sand grains, have a pronounced effect in decreasing permeability. With bentonite, there is only about one-third as much fines to thus plug the pores of the sand as is the case in using bonding clay, so that for a given green strength, the bentonite mixtures have considerably higher permeabilities.

Cereals—For many years, low-grade wheat or rye flours were used as binders in foundry sands, especially when it was desirable that the sand lose its strength quickly after the molds were poured. Flour meets that requirement very well; being freely combustible it is rapidly burned out of the surface layers of the sand. When one remembers that paperhangers have for years used flour paste as an adhesive, it is hardly necessary to say that flour greatly increases the green strength of sand mixtures.

Today, instead of raw flour, various cereal derivatives are widely used in sand mixtures. These are mostly secondary products obtained from the processing of corn starch or corn meal, and their properties are more uniform than those of flours, which vary considerably in successive lots. Sold under a number of trade names, the cereal binders are now generally considered an absolute essential in sand mixtures used for green sand molding and for many kinds of cores. The amount of cereal used is generally from 0.6 to 0.9 per cent of the sand mixture, occasionally as high as 2 per cent. In bentonite-bonded sands, the cereal-bentonite ratio is maintained at between 1 to 2 and 1 to 4. In American foundries, the most common proportion is 1 part cereal to 3 parts bentonite.

One of the principal reasons for using cereal binders in molding sand mixtures is that they prevent the surface of the rammed sand from losing its moisture too rapidly and becoming dry, crumbly and hard to patch and slick down. Cereal not only slows down the evaporation of moisture from the surface of the sand, but is thought to make the sand more readily workable at a lower moisture content than sands in which no cereal is used. When dried out, cereal-bonded sands have a firm, hard surface.

Cereals increase both the green and the dry compressive strength of sand mixtures, and being combustible, like all organic materials, they burn out readily when exposed to liquid steel, reduce the hot strength

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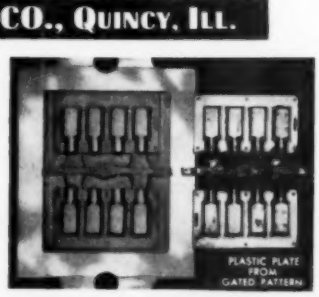


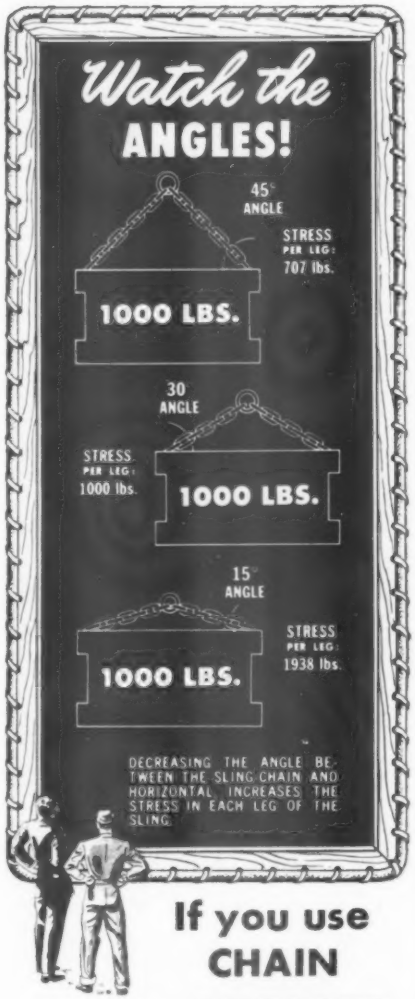
and promote collapsibility of the sand. For this reason they are widely used in oil-sand cores that must disintegrate quickly after the castings are poured, so as not to resist the contraction of the steel.

Like any other fine material, cereal closes the voids between the grains of sand, and thus decreases the permeability of sand mixtures. When the cereal is burned out by the heat of the steel, the products of combustion are gaseous and must of course be allowed to escape through the sand pores. A given amount of cereal produces much more gas and produces it faster than an equal amount of clay or bentonite does, because the only gas-forming substance in the latter materials is the water of crystallization which is driven off only at high temperatures.

Because cereal thus generates gases that have to be vented off, it has at times been suggested[17] that it might be better to use only bentonite or other non-gas-forming binders in green sand mixtures, and omit cereals altogether. A few shops have followed this practice, but the consensus is not in favor of it, and in American steel foundries the use of cereals in green sand mixtures and in oil sand cores is nearly universal. During the war, in fact, when cereals for foundry purposes were hard to get, no thoroughly satisfactory substitutes were developed, and to operate without cereals was found to be next to impossible.

Lignin—As mentioned earlier, molasses was formerly used extensively to give cohesiveness to sand mixtures, especially when the naturally bonded sands were the chief molding material in steel foundries. As offgrade molasses was generally purchased, there was a wide variation in the properties of successive lots; and fermentation in storage, particularly troublesome in hot weather, further altered the properties. Though molasses is still used to some extent, steel foundrymen today favor other materials. One of these is lignin, a byproduct obtained in the manufacture of paper pulp by the sulphite process, and sold under a trade name, either as a dry powder or as a water solution. Its properties vary far less than do those of molasses, and unlike molasses it does not ferment in storage.

Used in sands bonded with clay or bentonite, lignin somewhat increases the green strength, and gives much higher dry strength and hardness. This is especially true of mixtures containing bonding clays, in which quite a high proportion of lignin is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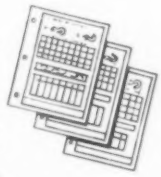

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generally used, in order to produce a sand that will not dry out rapidly and become crumbly. Mixtures of this type produce molds and cores with a hard, tight surface.

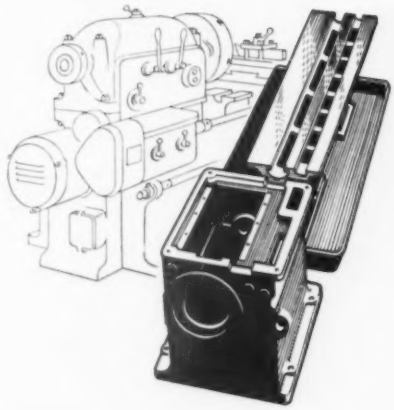
Diluted lignin solutions are used to a considerable extent to spray the surfaces of both green and dry sand molds and cores at places where it is desired to increase the sand's hardness and its resistance to washing. Molded gates and the areas near the gates in green sand work, and the surfaces of dry sand molds and cores exposed to the flow of the steel, are often sprayed in this manner.

Pitch—Obtained as a byproduct of coke manufacture, pitch gives high dry strength to sand mixtures, and is used particularly for heavy cores, such as those employed in making built-up or core-assembly molds for large castings. Not being water-soluble, it must be softened by heat to develop its full bonding properties. For this reason the temperature at which pitch-bonded sands must be dried are higher than those required in the case of sands bonded with cereals and other organic materials, which are dried by merely driving out the moisture.

Pitch is a comparatively cheap binder, and has the advantage that dried cores bonded with it absorb moisture from damp atmospheres much more slowly than those in which any of the other binders are used. It is largely for this reason that it is so extensively employed in making cores to form parts of core-assembly jobs, which usually are made up some time before they are to be used and may be kept in storage for several days. The mixtures used to form the greater part of these big cores generally contain a fairly high proportion of old sand, and experience has shown that pitch gives satisfactory strength and moldability to such mixtures better than any other relatively cheap binder.

As pitch softens at about 500° F, it is generally used only in the portions of heavy cores that do not come in immediate contact with the steel. A layer 2 or 3 in. thick composed of sands heavily bonded with clay and lignin or similar materials, forms the exposed parts of these cores, the balance of the box being filled with pitch sands.

Internal cores that must soften soon after the mold is filled with steel, in order to keep the castings from cracking, are also sometimes made of sands in which pitch is the chief bonding material. Sands in which other bonds are used, how-



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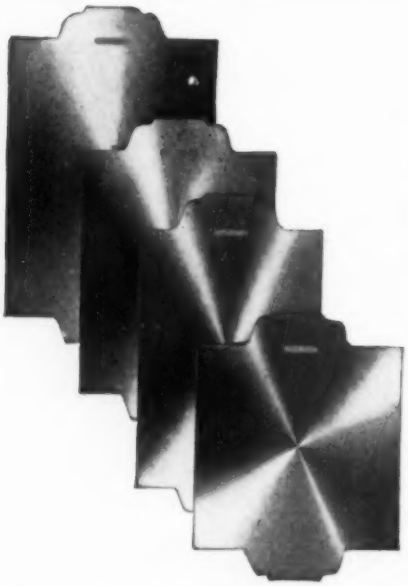

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11 x 18	9.35	14 x 16	10.15
12 x 14	8.55	14 x 18	12.10
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ever, lose their strength more quickly and completely and are preferred for work where softening must occur very early. Pitch-bonded sands meet the requirements of cases where the sections of the casting are fairly heavy, so that the core must retain its strength until a thick skin of solidified steel has formed, then soften and give way as the casting contracts.

Gilsonite—A natural asphalt, gilsonite is sold under a trade name as a binder, and behaves somewhat the same as pitch. Binders in which gilsonite is used differ from pitch in having a much higher proportion of incombustible material which remains in the sand as ash when the binder is burned out.

Resins—Various natural and synthetic resins, which like pitch must be heated in order to develop their full bonding properties, are used in core sands. They are sold under a number of trade names, and their properties vary, depending upon the type and source of the resin. Cores bonded with these materials resemble those in which pitch is the chief binder, in resisting the absorption of moisture from damp atmospheres. The natural resins have a very low ash content, while some of the synthetic ones are high in ash. The pine resins soften readily under the heat of the metal, so that sands bonded with them are readily collapsible.

One class of synthetic resins, instead of softening when heated and hardening again when cool, like pitch or the pine resins, is made permanently hard by heating to the comparatively low temperature of 200 to 300° F. These materials, known as the thermosetting resins, make it possible to complete the baking of cores very rapidly, and are used particularly for small cores baked by dielectric heating. In this process, the cores are passed between a pair of metal plate electrodes, across which an alternating current voltage is applied, at a frequency of some 15,000,000 cycles per second. Heat is rapidly generated throughout the body of the core, driving out the moisture and converting the resin binder into its permanently hard, strong condition. The cores are dried much more rapidly than when they are exposed to an outside source of heat, which penetrates the sand slowly because of its comparatively low heat conductivity.

Proteins—A number of protein materials, such as casein, are used as binders, especially for cores. They have good binding qualities, and as they burn out of the sand at low

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temperatures, they are used particularly for cores that must collapse early and readily. Glue, which is also classed as a protein, is used as a base for certain proprietary binders. Sands bonded with this material are much less collapsible than those in which casein is used, and in fact retain a considerable amount of compressive strength after two-minutes' heating at 2500° F.

Core Oils—The best known and most widely used binder for cores that must collapse readily and quickly is linseed oil. Pure linseed, either raw or boiled, is relatively expensive and is seldom used alone. Instead, various commercial core oils are substituted. Most of these oils, which are sold under a variety of trade names, contain boiled linseed as a base, mixed with various marine, vegetable and mineral oils, resin, etc. Their prices vary rather widely and apparently depend to a considerable degree upon how much linseed oil is in the blend. The available information indicates that linseed oil has the best combination of properties of any of the available oils, and that if an oil contains a high proportion of linseed it will give the most satisfactory results. In particular, cores bonded with such an oil are less likely to be weakened by over-baking than are those in which less pure oils are employed.

(To be continued next month)

References

7. A. H. Dierker, "Reclaiming Steel Foundry Sands," *Transactions*, American Institute of Mining and Metallurgical Engineers, Iron and Steel Division, 1930, page 83.
8. P. L. Goodale, "Notes on Behaviour of Sand Molds in Steel Foundries," *Transactions*, AFS, Vol. 38, 1930, page 471.
9. *Foundry Sand Testing Handbook*, American Foundrymen's Society, 1944 edition, page 56, Section 308.
10. Charles W. Briggs, *Metallurgy of Steel Castings*, page 342.
11. Norman Dunbeck, "Southern Bentonite in the Steel Foundry," *Transactions*, AFS, Vol. 51, 1943, page 929.
12. E. J. Ash and E. O. Lissell, "Some Fundamental Aspects of Foundry Sands," THE FOUNDRY, July, 1941, page 60 and August, 1941, page 60. Fig. 7 presented herewith combines with certain omissions the data presented in Figs. 8 and 9 of the article.
13. Charles W. Briggs and R. E. Morey, "Synthetic Bonded Steel Molding Sands," *Transactions*, AFS, Vol. 47, 1939, page 653.
14. R. E. Grim and F. L. Cuthbert, *Bulletin*, University of Illinois, Vol. 42, No. 50, July 31, 1945, bulletin series No. 357.
15. Charles W. Briggs, *Metallurgy of Steel Castings*, page 362, line 5.
16. R. E. Grim and F. L. Cuthbert, loc. cit., page 12, line 27.
17. Charles W. Briggs and R. E. Morey, loc. cit., page 653.

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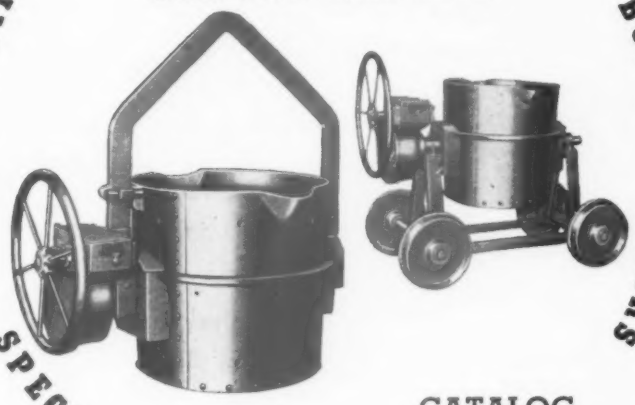

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Now available are 169 different standard hydrocarbons, some of which are certified also for density, refractive index, and heat of combustion in addition to purity. Issue of samples of specific pH value, a unit expressing the degree of acidity or alkalinity of aqueous solutions, has aided science and industry in obtaining greater accuracy and uniformity in pH measurements. Details of the latter are contained in NBS Technical News Bulletin 31, 138, Dec. 1947.

Spectrographic Determination

(*Continued from page* 103)

0.005 to 0.025 per cent, and Mg 2852.13 Å for the range 0.020 to 0.15 per cent magnesium. An iron line 2795.54 Å[7] might be expected to interfere with the magnesium line 2795.53 Å, but it has not been detected above background using pure iron samples with this technique. The same observation applies to the weak iron line of 2852.13Å[7], which, therefore, does not appear to cause appreciable error in determinations involving over 0.020 per cent magnesium. The iron line at 2851.79 Å tends to interfere with the reading of the 2852.13 Å magnesium line, but this is serious only when the magnesium content is below 0.025 per cent.

Combining the solution method of obtaining standards with appropriate lines and working curves from the customary procedure for cast iron provides foundry control for magnesium which is unique in being entirely spectrographic and not dependent on the usual chemically analyzed standards.

Method of Analyzing Standards—Since accurate spectrographic analysis requires the measurement of the

minor constituent in respect to the major constituent, it is necessary to provide materials with known magnesium to iron concentration ratios, to be used as a basis for analyzing the metal standards. This is accomplished by preparing separate iron and magnesium solutions of known concentrations and combining them in varying proportions so as to produce the necessary range and number of concentration ratios.

Preparation of Synthetic Solutions—A few grams of magnesium-free iron are dissolved in hydrochloric and nitric acid to provide a solution of 0.05 g iron content per milliliter. The iron and the reagents should be tested spectroscopically for magnesium contamination before using them. Iron, especially, has been found to be a troublesome source of contamination. Bureau of Standards Standard Sample No. 55b ingot iron has proved satisfactory.

Next, a series of aqueous solutions of magnesium with concentrations ranging from 0.001 to 0.20 per cent are prepared by dissolving weighed amounts of a stable and chemically pure magnesium salt, such as $MgSO_4 \cdot 7H_2O$.

Propane Synthetic Solutions

The final synthetic solutions are then prepared by combining constant amounts of the iron solution with the volumes of magnesium solution required to produce the necessary ratios of magnesium to iron. These ratios should be distributed throughout the range of 0.001 to 0.20 per cent magnesium. Since it is necessary that all final solutions contain the same weight of iron per unit volume regardless of the amount of magnesium solution added, dilution to a common final volume is required.

Preparation of Nodular Iron Solution—In order to obtain spectral densities comparable to those of the synthetic solutions, it is necessary that the nodular iron also be in solution form.

A sufficient weight of nodular iron is dissolved in acid to provide the same weight of iron per milliliter as is contained in each synthetic solution.

Preparation of Electrodes for Sparking—Since the iron concentration per milliliter has been made the same in both synthesized and nodular iron solutions, it is possible to prepare electrodes from either of these solutions in an identical manner. Graphite electrodes of purity equivalent to National Carbon Co. "Certified" grade are required. A convenient size is ¼-in. diameter by 1-in. length. The ends are machined

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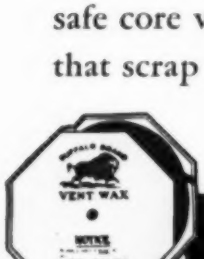

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flat and the entire electrode submerged in kerosene, at room temperature, for about 10 min. This impregnation with kerosene later prevents absorption of the aqueous solution. The electrodes are rolled on paper toweling to dry the surface somewhat and are placed on end in a rack.

By means of a micropipet, a 0.03-ml drop of solution is placed on the flat end of the electrode. Two electrodes are prepared identically for each exposure; both lower and upper electrodes contain the 0.03-ml drop. The electrode rack with electrodes is then placed in an oven to dry at 110° C for about 15 min to obtain a dry coating of solid residue on the end of each electrode. The drying temperature is considerably above the flash point of kerosene, so explosion precautions should be observed.

Source Conditions—The exact type of excitation does not appear to be critical, so almost any spark source could probably be used. It is thought however, that an air-interrupted spark with moderate capacitance is preferable. The following conditions have been used successfully:

Primary voltage to resistor	130 v ac
Primary voltage to transformer	60 v ac
Primary amperes	7.5 amp
Secondary amperes	7.0 amp
Auxiliary gap	2 mm
Analytical gap	3 mm
Secondary inductance	40 microhenries
Secondary capacitance	0.005μf
Breaks per half cycle	8 to 10

Spectrograph—The Bausch & Lomb medium quartz spectrograph is found to have sufficient dispersion for this particular analysis, and an entrance-slit width of 30μ is satisfactory. Eastman Spectrum Analysis No. 1 plates provide high sensitivity for the region used.

Exposures—A pre-exposure appears to be undesirable, since the greatest sensitivity is obtainable during the first few seconds of sparking. An exposure time of 12 seconds is sufficient for the range 0.01 to 0.10 per cent Mg when electrodes are placed 95 cm from the entrance slit and the light passes through a 200-mesh screen (approximately 33 per cent transmission) placed between the source and slit. Variation of exposure time appears to be the most desirable way of extending the analytical range.

Plate Processing—Customary processing is adequate. In this case, it has consisted of: Developing 1 min in D-8 at 70° F; hardening 20 sec in saturated aqueous $Cr_2K_2(SO_4)_4{\cdot}24H_2O$; fixing 1 min in Eastman X-ray (1:3 dilution).

Microphotometry—A University of Michigan microphotometer is used to measure Fe 2788.11 Å as the reference line and Mg 2802.69 Å as the element line. Spectra from the series of synthetic solutions are read, and intensity ratios plotted against log concentration, thus forming an analytical curve (Fig. 1). Intensity ratios from spectra of the nodular iron solutions are used to obtain concentrations from the same analytical curve. These analyzed nodular irons can then be used as metal standards in the routine procedure to follow.

Precision — Table I indicates the degree of precision obtained with this solution method. The average errors of ±10 per cent or less of the amount of magnesium present are considered satisfactory for these low ranges.

Control Method of Analysis — The control method of analyzing nodular iron is designed to fit a regular procedure[3] for cast iron analysis, so that within a few additional seconds magnesium can be determined along with other elements from the same spectrum.

Preparation of Samples—Samples of the molten metal are poured into iron or molybdenum molds to form $\frac{3}{16}$-in. diameter rod-shaped electrodes. The molds are preferably kept at a temperature sufficient to be completely dry, but not so hot as to prevent fast cooling of the sample rods. With the repeated use of a single mold it has been found that accumulation of heat in the mold causes voids and nonuniform center structure in the rods and makes reproducible analyses impossible. Fig. 2 illustrates variations in structure sometimes found in rods obtained under varied sampling conditions. A solid, uniform "white-iron" structure is thought to be desirable for precise analysis.

Sample rods are prepared for sparking by grinding the ends at an angle of 19 degrees to form cone-shaped tips. The rods are inserted into spark holders as electrodes and separated by a $\frac{1}{2}$-in. gap.

Source Conditions—The excitation source employed in this laboratory for routine cast iron analysis may be classified as a high-voltage condensed spark discharged by means of a synchronous mechanical interrupter. Approximate values employed in the excitation circuit are as follows:

Primary supply voltage	220 v ac
Primary resistance	13 ohms
Primary transformer voltage	125 v ac
Primary current	9 amp
Secondary transformer volt.	18,000 v
Secondary capacitance	0.005 μf
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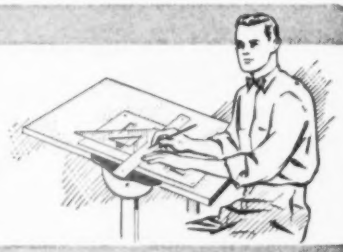

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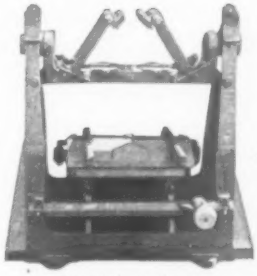

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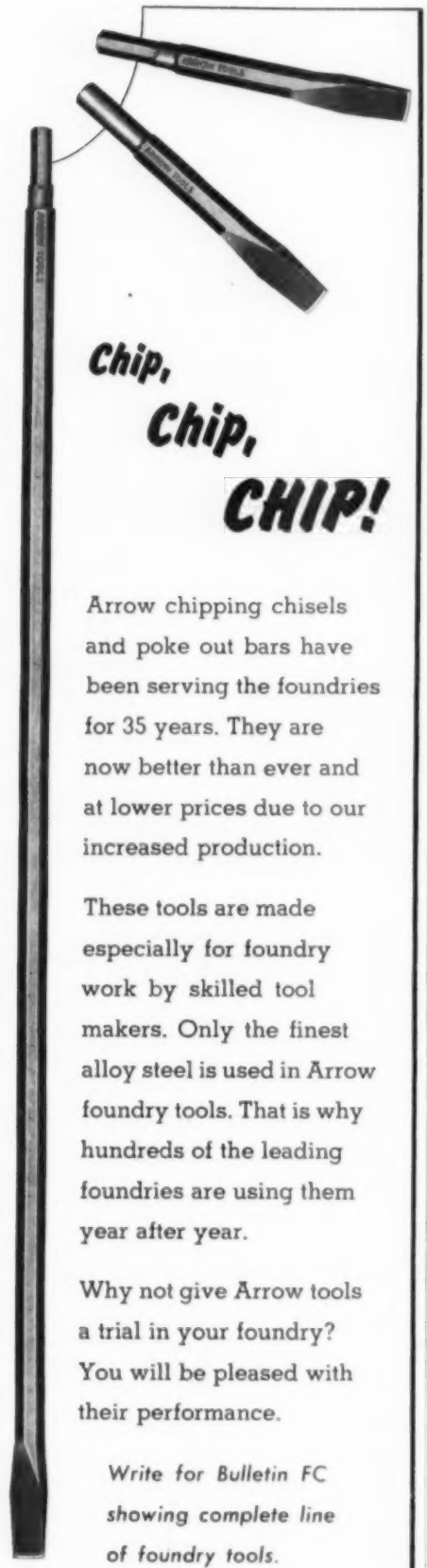

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TABLE I—Precision and Accuracy of Results Obtained by Solution Method of Analysis

Magnesium Added, Per Cent	Found, Plate No. 1	Found, Plate No. 2	Found, Plate No. 3	Found, Plate No. 4	Average Error	Maximum Error
0.01	0.012	0.010	0.011	0.011	0.001	0.002
	0.011	0.009	0.011	0.011		
0.05	0.051	0.052	0.048	0.047	0.003	0.004
	0.049	0.054	0.046	0.047		
0.10	0.100	0.110	0.097	0.105	0.006	0.010
	0.105	0.110	0.092	0.108		

is provided by means of a motor generator. A small air stream under 3 psi pressure "deionizes" the analytical gap.

Spectrograph — A large Littrow quartz prism spectrograph is adjusted for the photography of wave lengths from 2243 A to 2940 A to accommodate the elements customarily determined in cast iron. Several of the most sensitive magnesium lines also fall within this same wave-length range, necessitating no readjustment for the magnesium determination. Entrance-slit width and height are 40μ and ¼ in., respectively.

Photographic Exposures and Processing — The regular photographic procedure for cast iron can be used with no alteration for the determination of magnesium. Following a 5-sec pre-exposure, a 40-sec exposure provides measurable magnesium line densities. Spectrum Analysis No. 1 plates record the spectrum, and development is carried out in D-8 solution for 45 sec. Hardening, fixing, and drying are accomplished by conventional methods.

TABLE II—Precision of Results Obtained by Control Method of Analysis and Comparison of Results Obtained by Control and Solution Methods

Average Result of Seven Control Analyses	Average Deviation of Seven Control Analyses	Maximum Deviation of Seven Control Analyses	Result from Solution Method of Analyses
0.0074	0.0008	0.0013	0.0083
0.021	0.0013	0.003	0.022
0.021	0.0006	0.002	0.017
0.048	0.003	0.006	0.047
0.031	0.0025	0.005	0.030
0.039	0.0017	0.003	0.038
0.056	0.0036	0.005	0.046
0.122	0.0071	0.010	0.125

Microphometry — Line densities are measured on a microphotometer of University of Michigan design. In reading the spectrum, Mg 2795.53 A is found to cover a content range of about 0.005 to 0.025 per cent magnesium when the iron line 2823.27 A is used as the reference.

Another magnesium line accommodates the range from 0.020 to 0.15 per cent magnesium. This line is Mg 2852.13 A with which the same 2823.27 A iron reference line is used.

Analytical Curves—Working curves based on the use of these two magnesium lines are presented in Figs. 3 and 4. Standards used in the construction of the analytical curves for the routine determination of magnesium were obtained by means of large iron molds, providing 25 rods each. The rods were poured from batches of metal having graded amounts of magnesium added. Four rods from each batch were pulverized to provide a suitable sample for the solution method of determining magnesium, described earlier in this paper. The remaining rods are used as working standards, with values based on the solution method of analysis. It has been found advisable to include at least one standard with each group of iron samples analyzed and to duplicate sample determinations from two different pairs of pins for improved accuracy.

Precision—Table II indicates the degree of precision obtained with the control method. The average deviations of approximately ±10 per cent and less of the amount of magnesium present are adequate for routine control purposes.

References

1. H. B. Vincent and R. A. Sawyer, "The Spectrograph in the Iron Foundry for Rapid and Accurate Control Analysis," *Journal of Applied Physics*, Vol. 8, pp. 163-173 (1937).
2. H. B. Vincent, R. A. Sawyer, and A. M. Sampson, "The Spectrograph in the Iron Foundry," *Metals and Alloys*, Vol. 9, pp. 27-32 (1938).
3. H. B. Vincent and R. A. Sawyer, "Routine Spectroscopic Analysis in the Ford Motor Co. Foundry," *Metal Progress*, Vol. 36, No. 1, pp. 35-39 (1939).
4. G. W. Zabel and J. Schuch, "Modern Analysis in the Foundry," *Iron Age*, Vol. 145, No. 18, pp. 31-37 (1940).
5. F. B. Ling, J. McPheat, and J. Arnott, "Spectrographic Analysis of Cast Iron," *Foundry Trade Journal*, Vol. 70, pp. 233-238, 240 (1943).
6. T. M. Hess, E. L. McLaughlin, and M. A. Ulirey, "Spectrochemical Method of Analyzing Iron for Magnesium," Dowmetal Laboratory Methods Supplement DM109-50-649.
7. G. R. Harrison, Massachusetts Institute of Technology Wavelength Tables, John Wiley & Sons Inc., New York.

Editor's Note: This paper is reproduced from the ATSM *Bulletin*, December, 1949. Subsequently, the following comment was submitted to the authors by W. R. Kennedy, spectrographer, American Cast Iron Pipe Co., Birmingham. A more detailed discussion of some of Mr. Kennedy's work in magnesium determination was presented in THE FOUNDRY, October, 1949, p. 80.

"Having read your current paper in the ASTM *Bulletin*, December, 1949, entitled "Spectrographic Method for Determining Magnesium in Nodular Iron," I thought you might be interested in our experiments.

"We used the porous cup technique described by Cyrus Feldman, *Analytical Chemistry*, p. 1941 (1949). In preparing our standard solutions and unknowns we used 0.10g of iron

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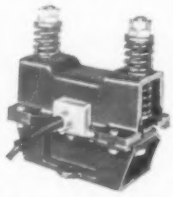

• Whether it's a molder's hopper, dust collector bin, shake-out hopper or processed sand bins, there is a Syntron Vibrator that will eliminate arching and plugging.

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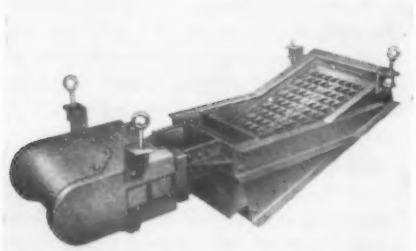

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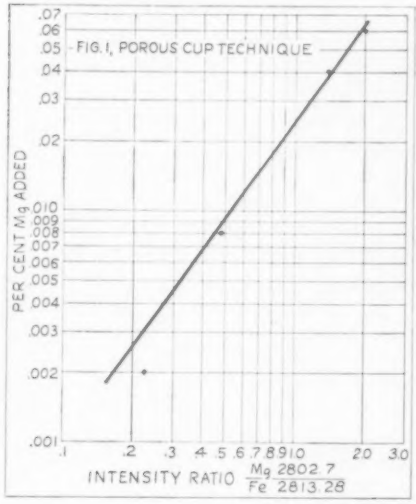
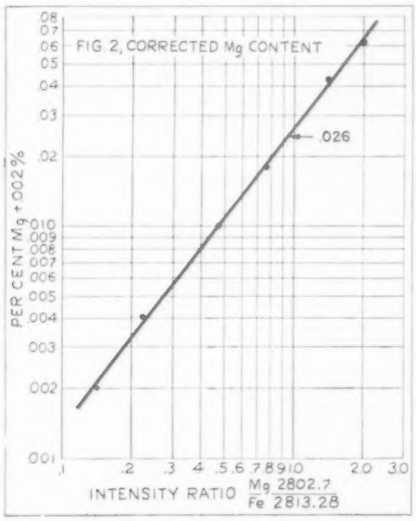
per milliliter. This is double the concentration which you reported, but we found that this concentration gave us spectra of good overall density at about the same exposure time for solid rod samples.

"In plotting our solution standards we noted that the lower values plotted low, indicating more magnesium content than added. We used N.B.S. 4g for our standard samples (see Fig.1). Assuming that the contamination came into solution with the N. B. S. 4g we then added constant amounts to all values of the standards until they all plotted on a straight line (Fig. 2). This constant amount represented the amount of magnesium in N.B.S. 4g and was 0.002 per cent. I was surprised at the similarity between our analytical working curves, since you used a solution dried on graphite and we used the porous cup; the slopes are almost identical. That the concentrations where Intensity Mg equals Intensity Fe (your Fig. 1) are equal is a coincidence, of course, since we used different line pairs."





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With the EDITORS

CONVENTION: On numerous occasions, Ed Hoyt has described the tremendous pleasure he found in seeing a major exhibition of foundry equipment and supplies grow from preliminary plans on paper to a living, vibrating thing with a definite personality that would stamp it forever in the book of memories. And when the week was over, the crowds had gone, and the job of dismantling got under way, there must have been a feeling of sadness among those who had so much to do in breathing life into an industrial spectacle which accelerated progress in the foundry industry.

This year it was our good fortune to follow the show during the building. We were with Al Hilbron, present exhibits manager, shortly after he arrived in Cleveland, and we watched the erection of the splendid operating exhibits and saw the beautiful displays in the making. There were times when progress seemed slow, when it appeared doubtful if things would be ready for the opening. But on Sunday afternoon before the opening, when the official inspection was made by President Ed Horlebein and his entourage, including Managing Editor Bill Gude, general chairman of the local chapter's convention committees, all of the pieces had fallen in place and the show was ready for the starting gun.

—o—

Thanks: All of us on the staff of THE FOUNDRY enjoyed greatly the pleasure of meeting so many of our friends in the industry. We appreciate your calling at our booth and we are sorry that time was too short for a leisurely type of visit. When the fall and winter meetings come along, perhaps we will be seeing you nearer home. In the meantime, why not drop us a note?

—o—

Castings Display: Cleveland citizens, as well as convention visitors, found considerable interest in a display of castings and molding methods in the windows of the Second Federal Savings & Loan Association on Euclid avenue near Public Square. The display was planned and arranged by the local chapter Publicity Committee, headed by Associate Editor Bob Herrmann. The molds, showing the various steps in the molding process, were prepared by Fred Pfarr of Lake City Malleable, who will head the NEO Chapter during the coming year. The bank estimates that 2000 people pass the window an hour, so that approximately 300,000 people were exposed to an interesting display of foundry practice and product during the two weeks it was maintained. Space does not permit us to reproduce a photograph of the window in this issue, but we promise one for July.

—o—

Ode to a Designer: Columnist Ralph Lee recently visited the G.H.R. Foundry Division, Dayton Malleable Iron Co., Dayton, O., and was given the following poem by Ernest J. Stockum, plant superintendent. Ralph thinks the effort, author of which is unknown, "kindo' cute" and so do we.

The Successful Designer

The designer bent across his board.
Wonderful things in his head were stored
and he said as he rubbed his throbbing bean,
"How can I make this thing hard to machine?"
If this part here were only straight
I'm sure the thing would work first rate,
But 'twould be so easy to turn and bore,
It never would make the machinist sore,
I'd better put in a right angle there
Then watch those babies tear their hair.
Now I'll put the holes that hold the cap
Way down in there where they're hard to tap.
Now this piece won't work, I'll bet a buck,
For it can't be held in a shoe or chuck,
It can't be drilled or it can't be ground,
In fact the design is exceedingly sound.
He looked again and cried, "AT LAST!"
Success is mine, it can't even be cast."

—o—

Vocabulary: Did you hear about the purchasing agent in the Middle West who sent out an inquiry for "paralytic malleable iron?"

Or perhaps you saw the recent item in *U. S. News & World Report* which discussed the impetus being given mechanization by the need to hold down labor costs, and said in part:

"A foundry now employs one man on a mold packing operation where 12 men were employed before. The change was made possible by installation of a power sand squirter mounted on a traveling crane."

—o—

Behind with the Hauling: This is being written on the Saturday following the close of the convention, when most of the editors came down to get the convention reports ready —so you will have them on time. But we are still tired, the feet hurt and out home the grass needs cutting and the screens are not up. Conventions are fun, but they surely put us in the position of the Indiana farmer who was "a little behind with his hauling."—F.G.S.

Electric Metal Makers To Meet

Electric Metal Makers Guild Inc. will hold its eighteenth annual meeting at the Shawnee Hotel, Springfield, O., on June 1-3. F. O. Lemmon, Ohio Steel Foundry Co., Springfield, O., is president; D. L. Clark, Simonds Saw & Steel Co., Lockport, N. Y., is vice president and R. J. McCurdy, Republic Steel Corp., South Chicago, Ill., is secretary-treasurer.

Ceramic Society Convenes

Officers were elected at the 52nd annual meeting of the American Ceramic Society, held Apr. 23-27, at the Hotel Statler, New York. J. W. Heppelwhite, Edwin M. Knowles China Co., Newell, W. Va., was elected president. C. S. Pearce is general secretary. Particularly notable papers reported developments in structural clay products, lightweight clay bodies and new, larger structural units.

Acid Open Hearth Tonnage Off

Total production of acid open hearth steel for the year 1949 poured both into castings and ingots was 866,614 tons, according to the Acid Open Hearth Research Association, Pittsburgh. This compares with 1,267,177 tons in 1948, 1,257,673 in 1947, 1,132,199 in 1946, 1,542,724 in 1945 and 2,107,493 in 1944. According to the report, 53.63 per cent of the 1949 tonnage was utilized for castings and 46.37 per cent for ingots.

Management Course

College of Engineering, University of Iowa, Iowa City, Iowa, is offering its eleventh management course, June 12 to 24. The course is designed for factory managers, foremen, industrial engineers, methods and time study analysts, cost accountants, and office executives, to present the best in management methods and to show how to use them effectively.

Tuition, including all books, is $150; meals are $22.50. Dormitory room rent is $26 for a single room and $19.50 for a double, for 13 days. Registration and communications concerning the course should be sent to J. Wayne Deegan, 122 Engineering Bldg., University of Iowa, Iowa City, Iowa.

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PRESSURE CONTROL: Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44—Catalog ND69-01-600(1) with accompanying diagrams shows typical applications of furnace pressure control equipment for open-hearth furnaces, pits, kilns, etc. Included are views of furnace pressure tap, control panel and control devices used to regulate damper position. Arrangement of specifications in tabular form affords easy, systematic reference.
For More Details Circle No. 90—Page 223

PROSPECT CONTROL: Remington Rand Inc., Management Controls Division, 315 Fourth Ave., New York 10—Booklet KD 539 outlines two systems designed to keep management in close control of sales development: Visible record system, a combination of records which forms a day-to-day and week-to-week plan; and a record folder system, an application of visibly signalled vertical folders for those who prefer a record requiring no transcriptions.
For More Details Circle No. 91—Page 223

ABRASIVE BELTS: Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6—"Step Up Production" booklet provides case-history examples and technical data on grinding and polishing with abrasive belts. Techniques are described and pictured for castings of gray iron, manganese, bronze and aluminum, etc. Details on belt equipment, belts, and various contact wheels are provided.
For More Details Circle No. 92—Page 223

ALUMINUM PAINT: Aluminum Co. of America, 661 Gulf Bldg., Pittsburgh 19—Brochure for users of aluminum paint emphasizes uses for metal and other absorbent surfaces, weather-exposed wood and interior heated surfaces. While the company does not make or sell aluminum paint, the information has been compiled for advantageous use. Several pages are devoted to questions and answers and an aluminum paint coverage table.
For More Details Circle No. 93—Page 223

INDUSTRIAL ELEVATORS: Barrett-Cravens Co., 4609 South Western Blvd., Chicago 9—Bulletin 4951 presents information on portable elevators available in 500, 1000 and 2000 lb capacity. Other elevators described include hand - operated types with load capacities up to 5000 lb; electric-operated portable types with capacities up to 5000 lb. Hand and electric telescopic portable types, barrel and drum, pallet, platform loading, balcony, revolving base, and floor-to-floor elevators are included.
For More Details Circle No. 94—Page 223

CERAMIC CORES: Harbison-Walker Refractories Co., Farmers' Bank Bldg., Pittsburgh 22—New folder on refractory strainer core shapes includes technical data on strainer core sizes and weights, and a table which indicates rate of metal delivery through cores under various head pressures. By eliminating slag and sand inclusions the ceramic cores make possible better castings with fewer rejects, and lowered costs.
For More Details Circle No. 95—Page 223

OVENS AND FURNACES: Lanly Co., 750 Prospect Ave., Cleveland 15—Catalog 490 illustrates industrial ovens and furnaces of various kinds, sizes and functions. Featured are foundry ovens, finishing ovens, heat treating ovens and furnaces, cabinet type ovens, ceramic products dryers and miscellaneous equipment. Balanced, recirculating air systems, advanced instrumentation and insulated metal panels are described.
For More Details Circle No. 96—Page 223

MOTORS: General Electric Co., Apparatus Dept., Schenectady, N. Y.—Bulletin GEA-5426 describes 3-phase and 2-phase high-speed synchronous motors in ratings from 20 to 1500 hp at 60 cycle speeds of 1800 rpm, as well as proportional horsepower ratings for speeds through 514 rpm. Applications for the motors are listed and typical installations are described.
For More Details Circle No. 97—Page 223

BATTERY CARE: Gould Storage Battery Corp., 467 Calhoun St., Trenton, N. J.—Revised edition of the pocket-size handbook offers instructions and engineering data on care of motive power storage batteries. Line drawings illustrate the theory of the lead-acid battery. Sections on care and operation, maintenance and repairs, parts and technical data are included.
For More Details Circle No. 98—Page 223

COMBUSTION CONTROL: Wheelco Instruments Co., 847 West Harrison St., Chicago 7—Bulletin F2-1 explains a new combustion safeguard for oil and gas fired furnaces, ovens, boilers, kilns and other heating equipment. Diagram showing details of operation is furnished. Electronic circuit causes instantaneous safety shut-off action to fuel valves in case of absence of flame.
For More Details Circle No. 99—Page 223

COUPLINGS: Falk Corp., 3001 West Canal St., Milwaukee 8—Bulletins 8100 and 8105 describe a redesigned coupling used primarily for

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For More Details Circle No. 100—Page 223

VENTILATORS: Iron Lung Ventilator Co., 4019 Prospect Ave., Cleveland—Circular describes features of the company's roof ventilators equipped with axial flow fans. Cutaway views of automatic damper and fresh air duct in ventilator installations are shown. Included are typical installations of the ventilators.
For More Details Circle No. 101—Page 223

PATTERNS: Motor Patterns Co., 3035 East 61st St., Cleveland 4—Brochure illustrates buildings, equipment and various departments of the company, including working scenes from the planning, lumber and wood, plaster, metal and drier departments. Wood milling machines, precision boring mill, gap lathe, and other installations are presented.
For More Details Circle No. 102—Page 223

FINISHING MACHINES: Hammond Machinery Builders Inc., 1637 Douglas Ave., Kalamazoo, Mich.—Catalog 50 describes the company's indexing, rotary automatic finishing machines. It also covers various types of abrasive belt and wheel type heads, suitable for a diversified number of grinding, polishing, buffing or deburring operations.
For More Details Circle No. 103—Page 223

MATERIALS HANDLING: Aerol Co., 2820 Ontario St., Burbank, Calif.—Materials handling manual suggests methods of cutting inventories. It illustrates company products and contains drawings showing their use for various materials handling problems. Dimensions, load ratings and code numbers are tabulated for easy reference.
For More Details Circle No. 104—Page 223

METALLIZING: Metallizing Engineering Co. Inc., 38-14 30th St., Long Island City 1, N. Y.—January issue of "Metco News" reports that sprayed metal coatings give positive protection against corrosion. Examples of practical applications in two specific cases demonstrate the advantage of metallizing to eliminate maintenance problems.
For More Details Circle No. 105—Page 223

VENTILATION: Dravo Corp., Fifth & Liberty Ave., Pittsburgh 22— Bulletin 520 discusses the use of equipment for bringing in fresh outside air heating it or not heating it and distributing it in a plant to replace contaminated air which has been removed from the building. Various installations are diagrammed and described.
For More Details Circle No. 106—Page 223

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Up to 61" x 79"
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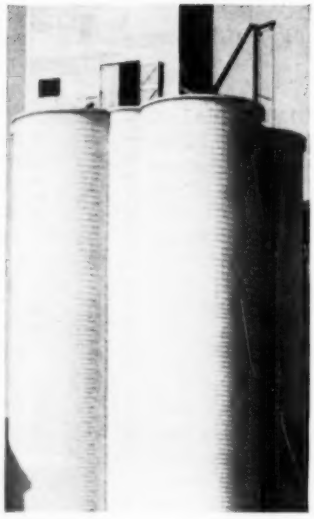

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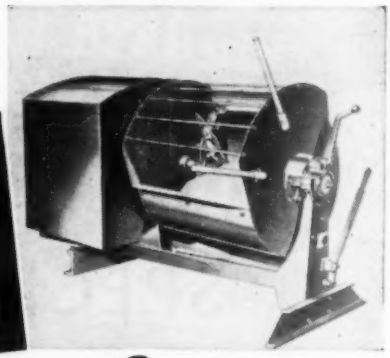

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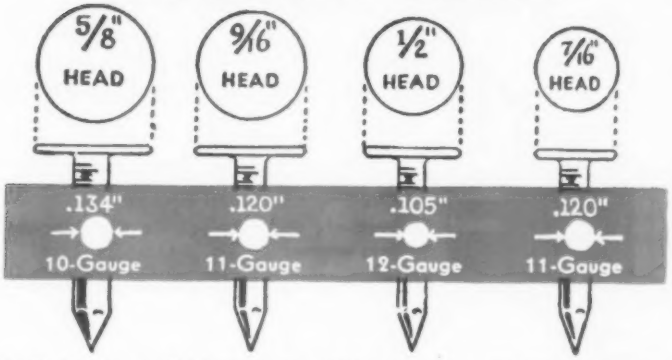

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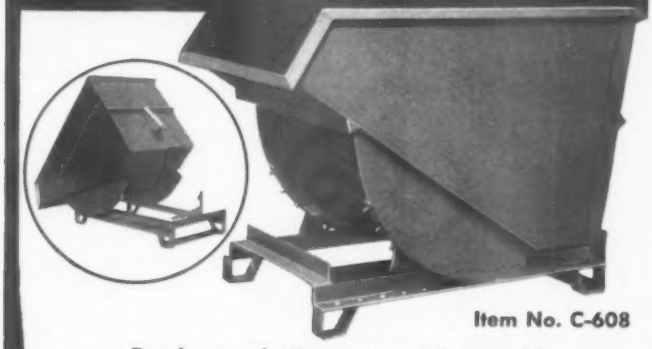

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Handling wet or dry, hot or cold, bulky materials quickly and easily, the ROURA is simple to operate—only one man is required for distributing and unloading—and he does this in much less time than ordinarily required under old-fashioned manual methods. Thousands of Roura Hoppers (which fit any standard fork or platform lift truck) are in constant daily operation, serving and saving for such firms as Owens-Illinois Glass, Corning Glass, National Fireproofing, General Motors, Ford, Chrysler, American Brake Shoe, General Electric, Westinghouse, Western Electric, American Steel Foundries, International Harvester, John Deere, etc.

By a simple lift of the exclusive release handle, the ROURA HOPPER dumps, rights and locks itself securely. Sizes — ½, ¾, 1, 1½ and 2 cubic yards; the ROURA HOPPER can also be designed for flat trucks and in other sizes to meet specifications. Also, it can be equipped with special flanges that permit stacking to desired tiers for storage or future distribution of materials — conserving valuable floor space. Priced below all competition, the ROURA will quickly pay for itself many times over.

Write today for detailed brochure.
"You Can Save 50% Labor-Time"

ROURA IRON WORKS, Inc.
1407 Woodland Ave. Detroit 11, Mich.

STOP DUST IRRITATION ...with NEW Sensational

Trial Sample $1.50 Postpaid

Easier to breathe through and talk through than an ordinary pocket handkerchief — yet filters non-toxic nuisance dusts as small as 1/25000 of an inch.

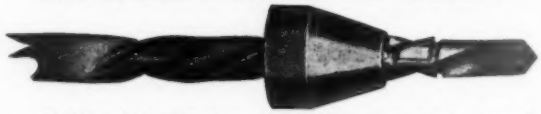
- Extremely light weight—only 1 oz. complete.
- Self-adjusting to every face size.
- Attractively styled to suit the most discriminating wearer.
- Simple in design—only 4 interlocking parts.
- Only respirator made with long-lasting washable filter—can be used over and over again.

Write TODAY for Descriptive Circular ➜

Here's dust protection ... your workers will welcome and WEAR!

THE GOGGLE PARTS COMPANY
1468-70 W. 9th Street • Cleveland 13, Ohio

SERVING YOU
in
"Core Blowing Operations"
INSERTING DRILL

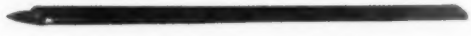


• Uniformity of holes • Faster insertion of vent
• Correct Depth

CORE BOX VENTS

DEEP HEAD Wide or Narrow Slots .014 .010
SHALLOW HEAD Wide or Narrow Slots .014 .010
MESH .035

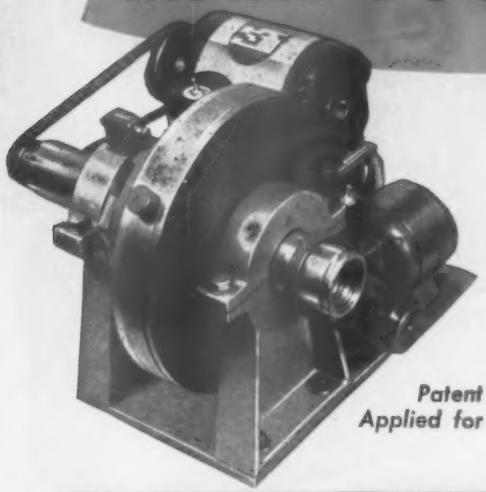
VENT CLEANER



for Cleaning Slots
Made of Tempered Steel, Easy to Use

C. M. SMILLIE & CO.
1124 WOODWARD HGTS., FERNDALE 20, MICHIGAN
TOOLS • PRECISION MACHINED and GROUND PARTS • FIXTURES

NO MORE GUESSWORK . . .
MAKE YOUR OWN SHOT TESTS!



Patent Applied for

- This amazing new proving machine will give you accurate test of *any* blasting shot or grit.
- Actual blasting conditions are reproduced inside the machine which accurately measures the value of any blasting material and enables you to select the *right* shot or grit for your blasting job.
- Costly waste of "buy and try" is eliminated.
- Ask for a free demonstration in your *own* plant with your own shot or grit.

Developed by the makers of "AMASTEEL Trualloy", "PEENBLAST", "CLEANBLAST" and "ALLOY 99"

PRODUCERS OF
PEENBLAST
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ALLOY METAL ABRASIVE CO.

311 WEST HURON ST. ANN ARBOR, MICH.

Fastest possible dressing action on snagging wheels and other large or coarse wheels calls for Desmond Huntington dressers. Five types of handles and three sizes of cutters meet the full range of requirements. Write The Desmond-Stephan Manufacturing Co., Urbana, Ohio, for the complete Desmond Catalog No. 45F.

Desmond
DRESSERS & CUTTERS

SAVE KW's

BE A METER MISER

Control overheating—be a meter miser. Use the Wheelco Molten Metal Thermocouple with the adjustable extension as a sensing unit and the "Distant-View" Scale Pyrometer for accurate quick-checks of furnace, ladle and pouring temperature to achieve added production economy.

Wheelco instru*mentality* in action gives you finer finished products, lower production costs — ask for Bulletin MC-1, Wheelco Instruments Company, 724 W. Harrison Street, Chicago, Illinois.

wheelco *electronic controls*

There's a Complete Line of CASTMASTER Die Casting Machines

HIGH SPEED PRODUCTION MODELS FOR PRODUCING SMALL TO THE LARGEST SIZE CASTINGS!

Precision Built by Die Casting Engineers

- Cast-Master Die Casting Machines are designed and built by engineers with years of experience in the Die Casting Industry. Each model has been given months of actual operation under the most severe conditions.

All Cast-Master Models Can Be Converted From Cold Chamber to Gooseneck!

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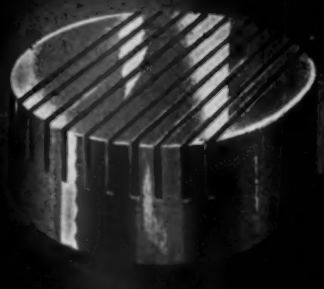
Send for COMPLETE ILLUSTRATED CATALOG

Precision



CORE BOX VENTS

Here's part of a complete line of DEMMLER core box vents—rigidly constructed in varying sizes of slotted brass—slotted steel—and screen mesh. Orders filled promptly from stock.

BRASS SLOTTED CORE BOX VENTS

Slot widths: .010", .013", .015"
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

STEEL SLOTTED CORE BOX VENTS

Slot widths: .010", .013", .015"
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

SCREEN TYPE CORE BOX VENTS

Mesh: #30, #40, #50.
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

SPECIFICATION CIRCULAR ON REQUEST

Wm. **DEMMLER** *& Bros.*
Kewanee, Illinois

No. 4 DAYTON RING VALVE BENCH

RAMMER

MORE POWER—MORE SPEED

You'll get more production with these faster, more powerful rammers and at the same time substantially reduce maintenance costs.

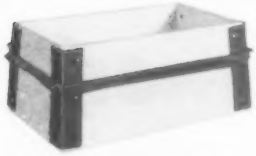
The Valve Units will last for years. The Cylinder Bores and Piston Rods are HARD CHROME PLATED which doubles the life of the Rammer. Many of the largest foundries in the country have already adopted them as standard. Made in six sizes to meet every requirement.

Send for Bulletin 300

DAYTON PNEUMATIC TOOL CO.
Manufacturers of Pneumatic Tools Since 1903
DAYTON, OHIO

Reduce PROFIT-EATING REJECTS

Change to CMD NON-BURN SLIP JACKETS



On jackets up to 8" deep, *Single* reinforcement angle irons are used. Deeper jackets have *Double* reinforcement angle irons.

These top-quality slip jackets **strip clean** from the mold every time! Made of Monasbestos one-half inch thick, CMD Slip Jackets will not burn . . . and they shed molten metal quickly and completely. Strong corner irons and cross reinforcing irons prevent warping. The corner irons are bolted to the jacket and the reinforcing members are arc-welded in place to assure permanent rigidity. **Write today for descriptive circular 650-F.**

CHICAGO MANUFACTURING & DISTRIBUTING CO.
1928 West 46th Street **Chicago 9, Illinois**

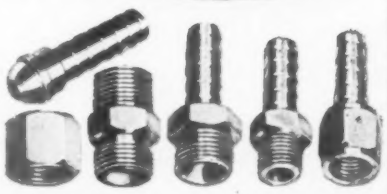
Air-O-chek The Valve with the internal fulcrum lever

An invention in valve means

Ingenious lever arrangement makes conventional packing stem and gland unnessary.

Used in leading foundries and machine shops.

See your jobber or write direct for full details



AIR-WAY PUMP & EQUIP. CO., 1058 N. Kilbourn Ave., Chicago 51 Ill.

COLOR YOUR CORE SANDS

Modern foundries have found it practical to color their various grades of core sands. This eliminates guesswork and assures the proper use of the required type of core sand for the particular job at hand.

Our laboratories have developed a line of special dyes in a range of colors that have been carefully tested and found suitable as well as economical.

Write us for details and samples.

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1490 Franklin Street Established in the year 1838 **Detroit 7, Michigan**

Canadian Branches: Windsor and Toronto

"make us prove it"

means

SERVICE SALESMANSHIP

means

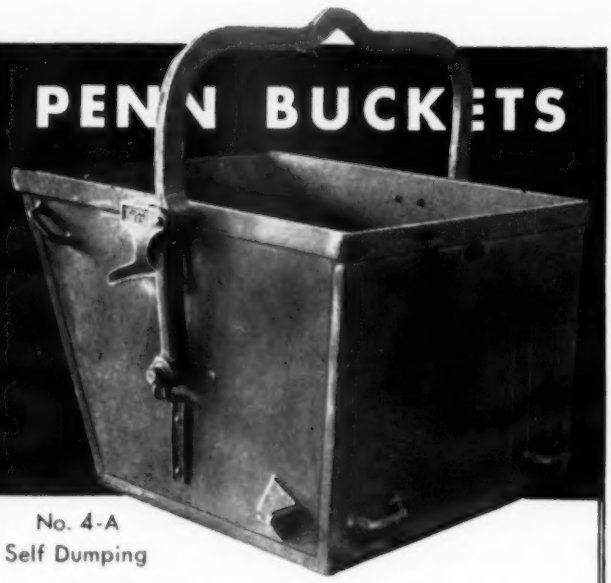
CLEANER, BRIGHTER CASTINGS

because

Bloomsbury Quality Foundry Facings insure uniform results all the time.

BLOOMSBURY GRAPHITE COMPANY, SINCE 1882 BLOOMSBURY, N. J.

PENN BUCKETS



No. 4-A
Self Dumping

Careful balancing makes Penn Buckets self dumping when loaded and self righting when empty. Welded construction prevents "clinging" makes them empty easily and completely.

MEMBER FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION FEMA

WRITE TODAY FOR NEW BULLETIN DIMENSION SHEET AND PRICE LIST

PENN IRON WORKS
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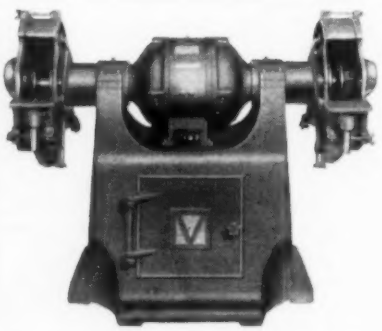

LOOKING FOR A PLACE TO *SAVE?*

You Can Cut Your *Wheel* Costs With A MARSCHKE GRINDER!

Every grinder in the Marschke line is built with two objectives in mind: (1) to give you a machine which will get the most work and the longest wear out of your grinding *wheels;* and (2) give you a machine with long, reliable and trouble-free service. The first is achieved through *elimination of vibration:* the second, through *quality materials* and engineering know-how.

The name "Marschke" means more than just quality, it means a complete *line* of grinding tools, adaptable to the solution of any grinding problem. Give us information on what you're up against, maybe we can suggest a solution.

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MOULDER CORPORATION
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BLOWERS and EXHAUSTERS for AIR and GAS

MULTI-STAGE STEEL BLOWER

CENTRIFUGAL TYPE
SINGLE AND MULTI-STAGE
½ LB. TO 7 LBS. PRESSURE
½ HP. TO 250 HP.

Since back in the '90's, these trustworthy Blowers and Exhausters have been faithfully serving American industry—for agitation and aeration — for combustion — for cooling and ventilating — for gas and acid production — for conveying — and numerous other applications having various pressure and vacuum requirements.

If you have a problem in handling air or gases of various densities, temperatures or chemical compositions, write today for latest bulletin, B-5, on Lamson Blowers and Exhausters.

LAMSON CORPORATION
BLOWER DIVISION
511 LAMSON ST. SYRACUSE 1, N. Y.

THE BEST BUY IS WATERLOX TRANSPARENT

Sealer and Impregnator for All Types and All Sizes of CASTINGS

Write the Manufacturer For Details

WATERLOX DIVISION
of
THE EMPIRE VARNISH COMPANY
2636 E. 76th St. CLEVELAND 4, OHIO

Let PYRO Save You Time & Money!

Measure Foundry Temperatures Accurately . . . at a Glance!

Use the Simplified PYRO Optical Pyrometer

Any operator can quickly determine temperatures of minute spots, fast-moving objects and smallest streams with the simplified PYRO Optical Pyrometer. Proved in actual use . . . foundrymen swear by it!

SELF - CONTAINED—DIRECT READING—No correction charts, accessories or upkeep needed!

ACCURATE—"Special Foundry Type" and "Triple Range" models also have Red correction scale to determine *true spout* and *pouring* temperatures of molten steel and iron when measured in the open.

LIGHT IN WEIGHT—Weighs only 3 lbs. complete.

AVAILABLE IN 5 RANGES from 1400° to 7500° F.

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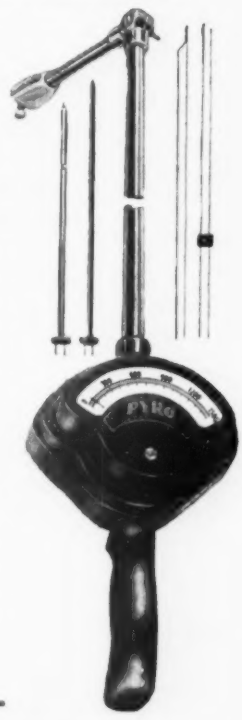
For Better Temperature Control in Non-Ferrous Foundries

PYRO IMMERSION PYROMETER



Accurate temperature control is a must to assure low cost production of UNIFORM, SOUND CASTINGS. That's why the new PYRO Immersion Pyrometer is indispensable in any modern non-ferrous foundry—in crucibles, ladles and furnaces.

The PYRO Immersion Pyrometer is shock-proof, moisture-proof, dust-proof and immune to magnetic influences. Withstands ronghest handling. Shielded steel housing. "Protected Type" and "Bare Metal" thermocouples interchange instantly without adjustment or recalibration. Large, 4-inch scale is easy to read. Has exclusive LOCK SWIVEL. Ranges 0-1500 and 0-2500° F.

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New Plant and Laboratory
BERGENFIELD 6 NEW JERSEY

A CONSISTENT RECORD OF Proved Reliability

For more than 75 years foundrymen have relied upon the uniform high quality of Hanna iron . . . the efficiency and cooperative service of Hanna's experienced personnel.

New type Hannatite for nodular use

FOUNDRY · MALLEABLE · BASIC
HANNATITE
SILVERY · FERRO-SILICON
Brands:
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ROSSBOROUGH

NONFERROUS FLUXES

•

LADLE COAT

•

PERMANENT MOLD SPRAY

Stocked by the Following Jobbers

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Dayton, Ohio	Fenton Foundry Supply Co.
Detroit, Michigan	Wolverine Foundry Supply Co.
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ROSSBOROUGH SUPPLY COMPANY
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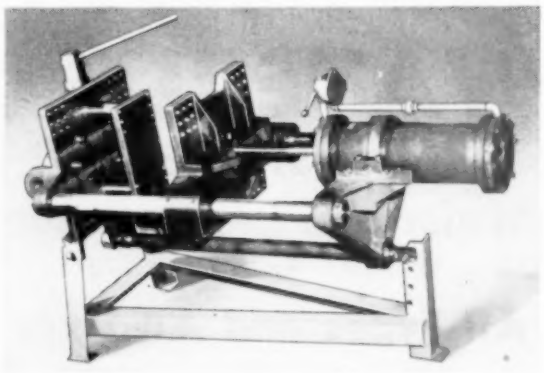
PERMANENT MOLD MACHINE

SAVE ON TIME & MOLD COSTS
USE INSERT TYPE MOLDS



FEATURES

- ADJUSTABLE FOR VARIOUS THICKNESS MOLDS
- USE EJECTOR PLATE VERTICAL OR HORIZ.
- TILTING STAND
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- GROUND GUIDE BARS
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- MEEHANITE FRAMES
- BUILT IN TWO SIZES

FOR INFORMATION & PRICES WRITE

RESERVE MACHINE & TOOL CO.
10026 DETROIT AVE. CLEVELAND 2, OHIO
DESIGNERS & MANUFACTURERS OF PERMANENT MOLDS

CUT core BAKING TIME 50%

WITH G-E 12300 FAST-CURING RESIN CORE BINDER

You'll find you can reduce baking times by 50% and more by using General Electric's G-E 12300 phenolic resin core binder.

HERE'S PROOF!

1. A 3-lb. half-core for differential housings: Former time—2 hrs. With G-E 12300—¾ to 1 hr. Reduction—50 to 65%.

2. A 10-lb. truck axle core: Formerly—two passes through tower oven. With G-E 12300—one pass only. Reduction—50%.

3. Tensile test cores: Former time to achieve maximum strength—40 min. With G-E 12300—16 min. Reduction—50%.

Besides reduced baking time, G-E 12300 offers (compared with conventional oil binders) lower cleaning costs, fewer casting rejects, and less breakage, because of its excellent collapsibility, shakeout, high permeability and low gas evolution.

For more information on how G-E 12300 can improve your core room technique, write to Section E1, Chemical Department, General Electric Company, Pittsfield, Mass.

You can put your confidence in

GENERAL ELECTRIC

"Lancaster" Mixers for Foundry Sands

Put More Valuable Minutes . . . In Every Man Hour

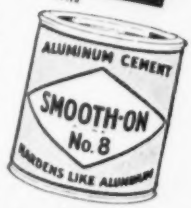
The exact and controlled conditioning of sand formulas by "Lancaster's" balanced mixing-mulling action puts more valuable minutes into every man-hour of the foundry production schedule. Core-sand mixes are developed to desired strength and permeability in any formula range. Binder or oil content can be reduced. And—"Lancasters" are "power-misers"—produce at maximum capacities with low power costs. Write today for catalog information . . . no obligation.

POSEY IRON WORKS, INC.
Brick Machinery Division
LANCASTER, PENNA., U. S. A.

For Surface Blemishes in ALUMINUM CASTINGS

Have you used the Smooth-On Foundry Cement made especially to correct blow holes, porous and rough spots, dents and other unsightly but harmless surface defects in otherwise sound *aluminum* alloy castings?

Applied like the widely used Smooth-On *Iron* Foundry Cement, Smooth-On No. 8 *Aluminum* Cement fills in evenly, hardens quickly, matches perfectly. Stays in place, too, for it expands slightly as it sets.



Smooth-On No. 8 Aluminum Cement comes in 1-and 5-lb. sizes. 1 lb. will fill 17 cu. in. Order it by NAME AND NUMBER from your supply house. If they haven't it, write us. If you have not yet discovered Smooth-On No. 8, ask us for

FREE SAMPLE TO TEST

You'll receive also the famous 40-page SMOOTH-ON HANDBOOK, filled with industrial uses for the various Smooth-On Cements. 170 illustrations. Write today.

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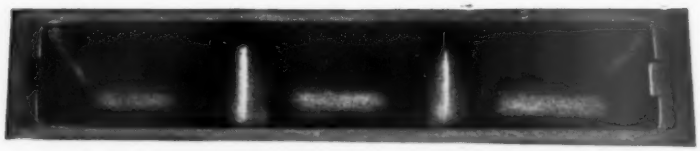
Do it with **SMOOTH-ON**
No. 8 ALUMINUM CEMENT

MELTING POTS—Ingot Molds

for ALUMINUM AND OTHER NONFERROUS METALS. 45 SIZES.

ROUND SPOUT POT NO. 550A
WITH 1½" COLLAR ON FLANGE



INGOT MOLD NO. AA-6

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HOLDING BOWL
NO. HP7001

Made of Acme SPECIAL-M-Heat Resisting Iron
— They Stand the Heat!

ACME FOUNDRY COMPANY

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USE THE IDEAL FUEL FOR . . .

DRYING MOLDS . . . PREHEAT CASTINGS . . . ON MOLTEN METALS . . . RECARBONIZE STEEL . . . MELT SOFT METALS

● The long-burning, uniform, penetrating heat of Ford Charcoal Briquets makes it the ideal fuel for an increasing list of foundry uses. And it's portable—to save you valuable time, space and money. Order today, and write for interesting information on use and equipment:

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CAST WITH PERMANENT MOLDS
Any Shape Casting

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LOW COST WITH UNSKILLED LABOR

HIGH PRODUCTION WITH LOW RATE OF REJECTIONS

IRON CASTINGS WITHOUT CHILL

WIDE VARIETY OF METAL ANALYSES

☆ LOW COST GREEN SAND OR DRY SAND CORES

IDEALLY SUITED FOR SOIL PIPE FITTINGS

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CENTRIFUGAL CASTING MACHINE CO.
P. O. Box 947 *Nathan Janco, Pres.* Tulsa 1, Okla.

ATLANTIC Band Saws

The Favorite Blades of Non-Ferrous Foundries for Over 20 Years

You will profit by using the tougher Atlantic blades for clean, speedy cutting of gates and risers from castings. You can eliminate unnecessary grinding operations—our specially milled tooth construction makes it easier to cut closer to the body of the casting. All Atlantic Metal Cutting Band Saws are guaranteed as to material, workmanship and temper.

Send for Atlantic Band Saw Catalog,
describing foundry cut-off operations.

ATLANTIC SAW MANUFACTURING CO.
Exclusively Band Saw Production

159 BREWERY ST.,
NEW HAVEN 11, CONN.

A BLAST FURNACE PRODUCT

Smelted from Superior quality lake ores, high grade metallurgical coke and limestone, using our own local No. 1 Sharon Seam coal.

HIGH SILICON IRON
JISCO

A "blend" with JISCO is sound metallurgy.

THE JACKSON IRON & STEEL *Company*
JACKSON, OHIO

Taylor Chain manufactures many grades and sizes of chain—each for a definite job. Only false economy can result when incorrect chain is used for a variety of jobs. See your mill supply distributor for help in selecting the proper chain.

PROOF COIL—Made from C-1008 steel having an approximate tensile strength of 5,000 P. S. I. Formed and butt welded into short links.

BBB COIL—Made from same analysis steel as Proof Coil. Formed and butt welded into shorter links for flexibility and more distribution of load.

HI-TEST—Made from C-1017 steel having an approximate tensile strength of 85,000 P. S. I. Formed, butt welded, heat-treated. It has greater resistance to wear than BBB or Proof Coil.

STEEL LOADING—Made from same steel as Hi-Test. After welding it is heat-treated to produce a chain that will stretch at lower loads than Hi-Test. High quality. A visible factor of safety.

S. G. TAYLOR CHAIN CO.
46 141st Street, Hammond, Indiana

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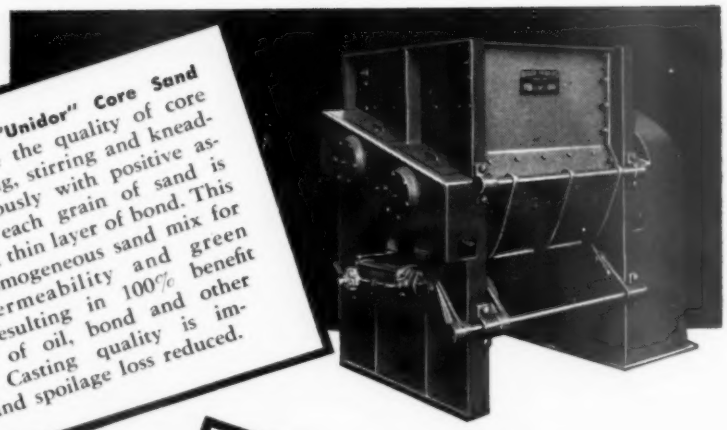
A GREAT NAME IN
Chain SINCE 1873

Send for free copy of new booklet containing complete data on all types of Welded Chain.

Better castings from improved sands...

BAKER PERKINS

"Unidor" core sand mixers and continuous mullers for molding sand



Baker Perkins "Unidor" Core Sand Mixers improve the quality of core sand by rubbing, stirring and kneading simultaneously with positive assurance that each grain of sand is coated with a thin layer of bond. This insures a homogeneous sand mix for desired permeability and green strength resulting in 100% from use of oil, bond and other binders. Casting quality is improved and spoilage loss reduced.

Baker Perkins Continuous Mullers are ideal for mixing and tempering molding sands on a large scale. Unique blade arrangement thoroughly mulls and aerates the tumbling sand mass, and each grain is correctly coated with bond. With a minimum of attention, the B-P Muller will deliver an uninterrupted flow of 30 to 120 tons of molding sand per hour with the proper size unit recommended for the job.

BAKER PERKINS INC.

FOUNDRY EQUIPMENT SALES, SAGINAW, MICHIGAN

"OLIVER" No. 45 Hand Feed RIP SAW

Unmatched for ripping light stock as well as heavy timbers. A sturdy, powerful machine with vertically adjustable table 3' wide, 5' long. Carries saws up to 26" diameter to saw stock to 9" thick and 26½" wide. Well safeguarded. *Write for Bulletin No. 45.*

"Oliver" also offers the **Straitline Ripper** with power feed to rip up to 120 ft. a minute

●

"Oliver" Rip Saws also made in lighter types

OLIVER MACHINERY COMPANY
GRAND RAPIDS 2, MICH.

THE MARK OF QUALITY INGOT!

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BRASS
BRONZE
ALUMINUM
INGOTS BEARING THIS BRAND ARE MANUFACTURED WITH THE PRECISION OF ACCURATE LABORATORY CONTROL
Your Guarantee Of Quality

NORTHWESTERN IRON & METAL CO.
LINCOLN, NEBR.

"In the Heart of the Great Midwest"

Here is a chronology of

RADIUM RADIOGRAPHY *that will greatly interest manufacturers of steel castings:*

1930— First commercial use of gamma rays; radiograph made of sternpost of cruiser "Chester".

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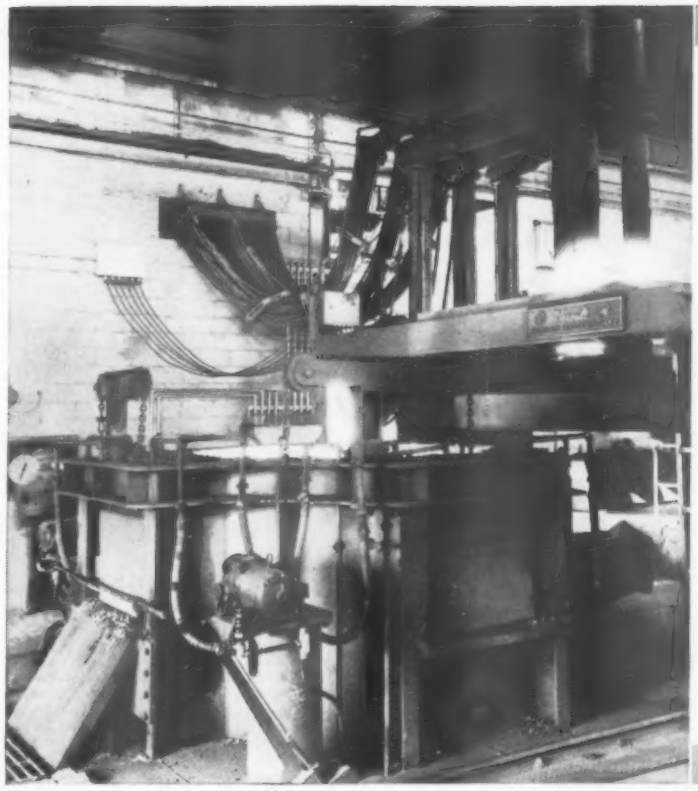

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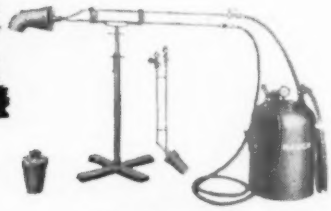

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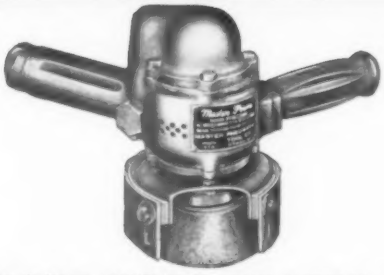

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Mexico Refractories Co., Mexico, Mo.
Norton Co., Worcester 6, Mass.
Chas. Taylor Sons Co., P. O. Box 58, Annex Sta., Cincinnati 14, Ohio.

BRIQUETS (Alloy)

Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, Ohio

BRIQUETS (Ferro Alloy)

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, Ohio

BRIQUETS (Graphite)

United States Graphite Co., Saginaw, Mich.

BRIQUETS (Silicon Carbide)

Carborundum Co., Perth Amboy, N. J.

BRIQUETING MACHINERY (Metal)

Milwaukee Foundry Equipment Co., 3328 Pierce St., Milwaukee 4, Wis.

BRUSHES

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

BUCKETS (Elevating, Clam Shell, Drag Line, Grab, Loader, Dumping)

Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Erie Steel Construction Co., Erie, Pa.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Penn Iron Works, Reading, Pa.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

BUILDING and ENGINEERING SERVICE

American Bridge Co., Pittsburgh 19, Pa.

BURNERS (Acetylene, Oil, Gas, Powdered Coal, Stoker)

Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.

BUSHINGS (Flask-Pin)

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Smillie & Co., C. M., 1124 Woodward Hgts. Blvd., Ferndale 20, Mich.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Universal Engineering Co., Frankenmuth, Mich.

CALCIUM BORIDE

Molybdenum Corporation of America, Pittsburgh 19, Pa.

CALCIUM MOLYBDATE

Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Molybdenum Corporation of America, Pittsburgh 19, Pa.

CARBON BOOSTER

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CARBON BOOSTER (Cont'd.)

Superior Flake Graphite Co., 33 S. Clark St., Chicago 3, Ill.
United States Graphite Co., Saginaw, Mich.

CARS (Core Oven)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

CARS (Mold Drying)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

CASTINGS

City Pattern Foundry & Machine Co., 1165 Harper Ave., Detroit 11, Mich.
Wheland Co., Chattanooga, Tenn.

CASTING MACHINES (Centrifugal)

Centrifugal Casting Mach. Co., Tulsa, Okla.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

CASTING MACHINES (Permanent Mold)

Centrifugal Casting Machine Co., Tulsa, Okla.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

CASTING SEALER

Empire Varnish Co., 2636 E. 76th St., Cleveland 4, Ohio
M. Flash Products Co., 2232 W. Chicago St., Chicago 22, Ill.
Metallizing Company of America, 3520 W. Carroll Ave., Chicago 24, Ill.
Tousey Varnish Co., 520 West 25th St., Chicago 16, Ill.

CASTINGS (Permanent Mold)

Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

CEMENT (Metallic)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
M. Flash Products Co., 2232 W. Chicago St., Chicago 22, Ill.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Smooth-On Manufacturing Co., 570 Communipaw Ave., Jersey City 4, N. J.

CEMENT (Refractory)

Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Alloys Corp., Vars Building, Buffalo 2, N. Y.
A. P. Green Fire Brick Co., Mexico, Missouri.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Ironton Fire Brick Co., Ironton, O.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Norton Co., Worcester 6, Mass.

CEREAL BINDERS

Chas. A. Krause Milling Co., 404 East State St., Milwaukee, Wis.

CHAIN (Hoist, Conveyor, Drive, Sling, etc.)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus, O.
Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Taylor Chain Co., S. G., Hammond, Ind.

CHAIN (Steel Loading)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.

CHAIN (Welded and Weldless)

Chisholm-Moore Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y
McKay Co., 1005 Liberty Ave., Pittsburgh 22, Pa.

CHAINS (Sling)

McKay Co., 1005 Liberty Ave., Pittsburgh 22, Pa.
S. G. Taylor Chain Co., Hammond, Indiana.

CHAPLETS

Angell Nail & Chaplet Co., 4580 E. 71st St., Cleveland, Ohio.
Cleveland Chaplet & Mfg. Co., 1197 W. 67th St., Cleveland 2, O.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.
Fanner Mfg. Co., Brookside Park, Cleveland 2, Ohio.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee 4, Wis.
Frederic B. Stevens, Inc., Detroit 16, Mich.

CHARCOAL

Tennessee Products & Chemical Corp., American National Bank Bldg., Nashville 3, Tenn.

CHARCOAL (Briquets)

Ford Motor Co., Iron Mountain, Mich.

CHEMICALS

Atlantic Chemical & Metals Co., 1925 N. Kenmore, Chicago 14, Ill.
Hercules Powder Co., Wilmington 99, Del.
Wm. F. Jobbins Co., Aurora, Ill.
Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.

CHEMISTS

Crobaugh Co., Frank L., 1426 West Third St., Cleveland 13, Ohio.

CHILLS

Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.
Angell Nail & Chaplet Co., 4580 E. 71st St., Cleveland, Ohio.
Fanner Mfg. Co., Brookside Park, Cleveland 2, Ohio.
Milwaukee Chaplet & Mfg. Co., 1023 So. 40th St., Milwaukee 4, Wis.
Standard Horse Nail Corp., New Brighton, Pa.

CHILL COATINGS

Acheson Colloids Corp., Port Huron, Mich.

CHILL NAILS

Angell Nail & Chaplet Co., 4580 E. 71st St., Cleveland, Ohio.
Capewell Mfg. Co., Hartford, Conn.
Standard Horse Nail Corp., New Brighton, Pa.

CHIPPERS—See PNEUMATIC TOOLS

CHISELS (Chipping)

Arrow Tools, Inc., 1900 S. Kostner, Chicago, Ill.
Cleco Division of Reed Roller Bit Co., Houston, Texas.

CHROMIUM (Briquets)

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

CLAMPS (Flask)

Diamond Clamp & Flask Co., Richmond, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Sterling Wheelbarrow Co., 1700 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

CLAMPS (Permanent Mold)

Master Pattern Co., 1315 Main Ave., Cleveland Ohio.

CLAY (Bonding)

American Colloid Co., 363 W. Superior St., Chicago 10, Ill.
Carpenter Brothers, Inc., 606 West Wisconsin 3, Mo.
Baroid Sales Division, 830 Ducommun St., Los Angeles 12, Calif.
Eastern Clay Products, Inc., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.

CLAY (Refractory)

Carpenter Brothers, Inc., 606 West Wisconsin 3, Mo.
Eastern Clay Products Inc., Jackson, O.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Chas. Taylor Sons Co., P. O. Box 58, Annex Sta. Cincinnati 14, Ohio.

CLAY STORAGE BINS

Neff & Fry, Camden, O.

CLEANING EQUIPMENT (Castings)

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.

CLUTCHES (Magnetic)

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 622 S. 28th St., Milwaukee 4, Wis.

COAL STORAGE BINS

Neff & Fry, Camden, O.

COKE (Foundry)

DeBardeleben Coal Corp., 2201 First Ave., N., Birmingham 3, Ala.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Inland Steel Co., 38 So. Dearborn St., Chicago 3, Ill.
Pickands, Mather & Co., Cleveland 14, O.
Republic Coal & Coke Co., 8 So. Michigan Ave., Chicago 3, Ill.
Semet-Solvay Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Tennessee Products & Chemical Corp., American National Bank Bldg., Nashville 3, Tenn.

COKE (Petroleum)

Republic Coal and Coke Co., 8 S. Michigan Ave., Chicago 3, Ill.

COLLECTORS (Dust)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland, O.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Pangborn Corp., Hagerstown, Md.
Schmieg Industries, 302 Piquette St., Detroit 2, Mich.
Schneible Co., Claude B., 2827-25th St., Detroit 16, Mich.

CONCRETE STORAGE BINS

Neff & Fry Co., Camden, O.

CONTROL SYSTEMS (Dust)

American Air Filter Co., 223 Central Ave., Louisville, Ky.
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Schmieg Industries, 302 Piquette St., Detroit 2, Mich.
Claude B. Schneible Co., 2827 25th St., Detroit 16, Mich.

CONVERTER BLOWERS

Roots-Connersville Blower Corp., Connersville, Ind.

CONVERTERS (Bessemer)

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

CONVEYOR DESIGN

Frank D. Campbell, 332 So. Michigan Ave., Chicago, Ill.
Giffels & Valet, Inc., Marquette Bldg., Detroit, Mich.
Palmer-Bee Co., Westminster & G.T.R.R., Detroit 12, Mich.

CONVEYORS (Apron)

Logan Co., 580 Cabel, Louisville, Ky.

CONVEYORS (Belt)

Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Imperial Belting Co., 1800 So. Kilbourn Ave., Chicago 23, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Chain)

Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Palmer-Bee Co., Westminster & G.T.R.R., Detroit 12, Mich.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Gravity)

Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Live Roller)

Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Standard Conveyor Co., North St. Paul 9, Minn.
Palmer-Bee Co., Westminster & G.T.R.R., Detroit 12, Mich.

CONVEYORS (Magnetic)

Stearns Magnetic Mfg. Co. 662 S. 28th St., Milwaukee 4, Wis.

CONVEYORS (Monorail)

American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 E. 283rd St., Wickliffe, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Penn Iron Works, Reading, Pa.

CONVEYORS (Overhead)

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Palmer-Bee Co., Westminster & G.T.R.R., Detroit 12, Mich.

CONVEYORS (Pneumatic)

Fuller Company, Catasauqua, Pa.

CONVEYORS (Portable)

Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

CONVEYORS (Portable-Gas Electric)

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

CONVEYORS (Rubber)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Vibrating)

Ajax Flexible Coupling Co., Westfield, N. Y.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Simplicity Engineering Co., Durand, Mich.
Syntron Company, Homer City, Pa.

COPPER

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

COPPER SHOT

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Niagara Falls Smelting & Refining Div., Continental-United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.

CORE BINDERS

American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y.
American Gum Products Co., 500 Fifth Ave., New York 18, N. Y.

CORE BINDERS (Cont'd.)

Bakelite Corp., 300 Madison Ave., New York 17, N. Y.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Corn Products Sales Co., 17 Battery Pl., New York 4, N. Y.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
General Electric Co., Pittsfield, Mass.
Hercules Powder Co., Wilmington 99, Del.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Chas. A. Krause Milling Co., 404 E. State St., Milwaukee 1, Wis.
Robeson Process Co., 500 Fifth Ave., New York 18, N. Y.
Superior Flake Graphite Co., 33 So. Clark St., Chicago 3, Ill.
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Superior Flake Graphite Co., 33 S. Clark St., Chicago 3, Ill.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

CORE BLOWER BUSHINGS

Eastern Clay Products, Inc., Jackson, Ohio.

CORE BLOWING MACHINES

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
International Molding Machine Co., LaGrange Park, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Western Hardware & Specialty Mfg. Co., 3830 No. Fratney, Milwaukee, Wis.

CORE BOXES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Industrial Pattern Works, 2625 West Belmont Ave., Chicago 18, Ill.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

CORE COLORING

Eaton Chemical & Dyestuff Co. 1490 Franklin, Detroit, Mich.

CORE COMPOUND

Bakelite Corp., 300 Madison Ave., New York 17, N. Y.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

CORE DRAWING MACHINES

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Freeman Supply Co., Toledo 5, O.
Newaygo Engineering Co., Newaygo, Mich.

CORE DRIERS (Dielectric)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

CORE GRINDERS (Power Operated)

Jeffrey Mfg. Co., Columbus 16, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
Sutter Products Co., Dearborn, Mich.

CORE KNOCKOUT MACHINES

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Pangborn Corp., Hagerstown, Md.
Simplicity Engineering Co., Durand, Mich.

CORE MAKING MACHINES

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Co., 3228 W. Pierce St., Milwaukee 4, Wis.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Wadsworth Equipment Co., 2457 Mogadore Rd., Akron, Ohio

CORE OILS

Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Frederic B. Stevens, Inc., Detroit 26, Mich.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

CORE OVENS

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, O.
Despatch Oven Co., Minneapolis 14, Minn.
Drying Systems, Inc., 1801 Foster Ave., Chicago 40, Ill.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, O.
Girdler Corp., Thermex Division, 224 E. Broadway, Louisville 2, Ky.
Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Ross Engineering Corp., J. O., 350 Madison Ave., New York 17, N.Y.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

CORE PASTE

Corn Products Sales Co., 17 Battery Pl., New York 4, N. Y.
Delta Oil Products Co., Milwaukee 9, Wis.
Eastern Clay Products Co. Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
Superior Flake Graphite Co., 33 S. Clark St., Chicago 3, Ill.

CORE PLATES (Steel, Asbestos)

Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Mo.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Johns-Manville, 22 E. 40th St., New York 16, N. Y.
Pressure Match Plate Co., 1013 N. Front St., Philadelphia 23, Pa.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

CORE ROD STRAIGHTENING and CUTTING MACHINERY

American Wheelabrator & Equipment Co., Mishawaka, Ind.

CORE SAND

American Silica Sand Co., Central Life Bldg., Ottawa, Ill.
Ottawa Silica Co., Ottawa, Ill.
Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.
Weldron Silica Co., 38 So. Dearborn St., Chicago, Ill.

CORE SAND MIXERS

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Baker Perkins Inc., Saginaw, Mich.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Clearfield Machine Co., Clearfield, Pa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, Ohio
Multiplex Machinery Corp., Elmore, Ohio.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Posey Iron Works Inc., Lancaster, Pa.
Royer Foundry & Machine Co., Kingston, Pa.

CORE STRIPPERS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE TRAYS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

CORE TRUCKS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

CORE VENTS

Demmler, Wm., & Bros., Kewanee, Ill.
Smillie, C. M. & Co., 1124 Woodward Heights Blvd., Ferndale 20, Mich.
United Compound Co., Inc., 328 South Park Ave., Buffalo 4, N. Y.

CORE WASH

Asbury Graphite Mills, Asbury, N. J.
Bloomsbury Graphite Co., Bloomsbury, N. J.
Carborundum Co., Perth Amboy, N. J.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill
Corn Products Sales Co., 17 Battery Pl., New York City 4.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Stevens, Frederic B., Inc., Detroit 26, Mich.
Superior Flake Graphite Co., 33 S. Clark St., Chicago 3, Ill.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
United States Graphite Co., Saginaw, Mich.

CORE WIRE CUTTERS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE WIRE STRAIGHTENERS

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE WIRES

Crescent Brass & Pin Co. 5766 Trumbull Ave., Detroit, Mich.

CORES (Annealing)

Pressed Steel Co., Wilkes-Barre, Pa.

CORES (Ceramic)

American Lava Corp., Chattanooga, Tenn.

COUPLINGS (Air Line)

Cleco Division of Reed Roller Bit Co., Houston, Texas.
U. S. Air Compressor Co., 5300 Harvard Ave., Cleveland 5, Ohio.

COUPLINGS (Flexible)

Ajax Flexible Coupling Co., Westfield, N. Y.

CRANE LUBRICATING SYSTEMS

Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.

CRANES (Bucket)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Electric Tramrail)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.

CRANES (Electric Traveling)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Erie Steel Construction Co., Erie, Pa.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Gantry)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Modern Equipment Co., Port Washington, Wis.
Wellman Engineering Co., 7000 Central Ave., Cleveland 4, O.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Hand Traveling)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Jib)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Monorail)

American MonoRail Co., 13104 Athens Ave., Cleveland 7 O.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.

CRANES (Self-Propelled)

Silent Hoist & Crane Co., 835 63rd St., Brooklyn 20, N. Y.

CRANES (Traction or Tractor)

Silent Hoist & Crane Co., 885 63rd St., Brooklyn 20, N. Y.

CRUCIBLES

American Crucible Co., North Haven, Conn.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
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TRADE ASSOCIATIONS

Crucible Manufacturers Association, 90 West St., New York 6, N. Y.
Foundry Equipment Manufacturers Association, Engineers Building, Cleveland, Ohio.

TRAMRAIL SYSTEMS

American MonoRail Co., 13104 Athens Ave., Cleveland 7, Ohio
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Modern Equipment Co., Port Washington, Wis.

TRAPS

Jas. A. Murphy & Co., Hamilton, Ohio.

TROLLEYS

Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis 20, Mo.
Modern Equipment Co., Port Washington, Wis.

TRUCK CRANES

Silent Hoist & Crane Co., 885 63rd St., Brooklyn 20, N. Y.

TRUCK WHEELS

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14 Wis.

TRUCKS (Casting)

Kwix-Mix Co., Port Washington, Wis.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

TRUCKS (Core Oven)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

TRUCKS (Gasoline-Industrial)

Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 14, Ohio.

TRUCKS (Lift)

Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 14, Ohio.

TRUCKS (Power Lift)

Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.
Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 14, Ohio.
Frank G. Hough Co., Libertyville, Ill.

TUBES (Annealing)

Pressed Steel Co., Wilkes-Barre, Pa.

TUBES (X-Ray)

General Electric X-Ray Corp., 4855 Electric Ave., Milwaukee 14, Wis.

TUMBLING BARRELS

Royersford Foundry & Machine Co., Royersford, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

TURNTABLES

Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Modern Equipment Co., Port Washington, Wis.
Newaygo Engineering Co., Newaygo, Mich.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

UNIT HEATERS

Dravo Corp., Neville Island, Pittsburgh 25, Pa.

VALVES (Air, Water, Steam)

Air-Way Pump & Equipment Co., 1050 N. Kilbourn, Chicago, Ill.

VALVES (Blow-off and Cut-off)

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Wm. H. Nichols Co., Richmond Mill, Long Island 18, N. Y.

VALVES (Oxygen, Acetylene)

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

VENTILATING SYSTEMS

American Wheelabrator & Equipment Co., Mishawaka, Ind.

VENTILATING SYSTEMS (Cont'd.)

Joy Mfg. Co., La-Del Division, New Philadelphia, Ohio.
Pangborn Corp., Hagerstown, Md.
Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.
Westinghouse Electric Corp., B. F. Sturtevant Div., 40 Wall St., New York 4, N. Y.

VENTS (Core Box)

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Demmler & Bros., Wm., Kewanee, Ill.
C. M. Smillie & Co., 1124 Woodward Hgts. Blvd., Ferndale 20, Mich.

VIBRATORS

Adams Co., Dubuque, Iowa.
Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Cleveland Vibrator Co., 2828 Clinton Ave. W., Cleveland 13, Ohio.
Davenport Machine & Foundry Co., Davenport, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.
New Haven Vibrator Co., 13' Chestnut St., New Haven 7, Conn.
Nichols Co., Wm. H., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.
S P O Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich
Syntron Company, Homer City, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

VIBRATORS (Core Bench)

Cleveland Vibrator Co., 2828 Clinton Ave. W., Cleveland 13, Ohio.
Martin Engineering Co., Kewanee, Ill.

WAX (Core, Vent, Pattern)

United Compound Co., Inc., 328 South Park Ave., Buffalo 4, N. Y.

WEDGES (Foundry)

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WELDING GAS

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

WELDING APPARATUS (Electric Arc)

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.
Metallizing Company of America, 3520 W. Carroll Ave., Chicago 24, Ill.

WELDING and CUTTING APPARATUS and SUPPLIES

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

WELDING ELECTRODES (Carbon)

National Carbon Co., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
United States Graphite Co., Saginaw, Mich.

WELDING RODS & ELECTRODES

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.
McKay Co., 1005 Liberty Ave., Pittsburgh 22, Pa.
Metallizing Company of America, 3520 W. Carroll Ave., Chicago 24, Ill.

WHEELBARROWS

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WHEELS, ABRASIVE (Cut-off)

Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Norton Company, Worcester 6, Mass.
Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.

WHEELS (Wire)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.

WIRE BENDERS

Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.

WIRE BRUSHES

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.

WIRE CUTTERS

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.

WIRE NAILS

Republic Steel Corp., 3100 E. 45th St., Cleveland 4, Ohio.

WOODWORKING MACHINERY

Do All Company, Des Plaines, Ill.
Oliver Machinery Co., Grand Rapids 2, Mich.

X-RAY EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
General Electric X-Ray Corp., 4855 Electric Ave., Milwaukee 14, Wis.

X-RAY FILMS

Eastman Kodak Co., Rochester, N. Y.
General Electric X-Ray Corp., 4855 Electric Ave., Milwaukee 14, Wis.

ZINC

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

—When writing advertisers, please mention THE FOUNDRY—

Classified Advertising

For Sale

FOUNDRY EQUIPMENT FOR SALE

1—4' x 6' Model "D" Simplicity Shakeout
1—Tabor Plain Jolt Molding Machine, 6" cylinder, 36" x 36" Steel Table, 1300# capacity.
1—Jeffrey Portable Sanditioner, Type "P", Form "B", Class 1.
1—Penn Iron Works Drop Bottom Bucket, 30 cu. ft. capacity.

"AMERICAN" ALUMINUM SNAP FLASKS
2—10" x 10", 5" Cope, 5" Drag
1—12" x 12", 5" Cope, 5" Drag
1—12" x 12", 6" Cope, 6" Drag
2—12" x 18", 5" Cope, 5" Drag
1—12" x 20", 5" Cope, 5" Drag
1—12" x 24", 5" Cope, 5" Drag
2—10" x 16", 5" Cope, 5" Drag
1—14" x 14", 5" Cope, 5" Drag

CRUCIBLE STEEL CASTING COMPANY
LANSDOWNE, PENNA.
PHONE: AL 4-5200

FOR SALE

MOLDING MACHINES
1—74W Osborn Plain Squeeze Portable
2—75W Osborn Plain Squeeze Portable
3—75J Osborn Jolt Squeeze Portable
3—Federal RAPID Jolt Squeeze Portable
2—SPO #611B Stationary Oscillating Jolt Squeeze Strippers
1—SPO #4½ JHS Air Jolt Hand Strip
BLOWERS FOR CUPOLAS AND FURNACES
1—Piqua Rotary Pressure Blower, rated 19 cu. ft per Rev.
Maxon-Premix Blowers for Gas, ¼ to 1 H.P.
METAL MELTING EQUIPMENT
1—Stationary crucible aluminum furnace, gas fired, 400# cap. complete with blower and motor
1—Hausfeld 2000# Aluminum Capacity Furnace, Barrel Type, open flame, oil fired.
2—Monarch-Rockwell Rotating 500# Brass, Oil
New 32" to 41" Dia. shell Cupolas made to order
TUMBLING MILLS AND SAND BLAST
5—28 x 60" round exhaust mills
1—Pangborn No. 2 GH direct pressure type sandblast barrel, motor driven. Complete Unit.
1—Pangborn Sand Blast Unit, including generating tank, shot cleaner, bucket elevator. Suitable for use with room
1—Pangborn Type EN-2 Sand Blast Cabinet, suction type, 5 x 3 x 7' high
MISCELLANEOUS
1—Continuous Heat Treat Furnace 57' long 1200° F. Max.
5—Koch electrically heated ovens for baking cores, 4½ ft. wide, 6 ft. high, 6 ft. deep, complete with recirculating fan and controls.
1—Young Bros. Tower Core Oven, 5 ft. x 1 ft. shelves, gas fired, complete with Foxboro control.
1—Young Bros. Batch Type Recirculating Hot Air, gas fired, Core Oven, 5 ft. x 6 ft. door opening, 9 ft. deep.
3—Foundry Equipment Co. sliding shelf core ovens with five 30 x 42" shelves, 8" high, gas fired.
1—Lamson Endless Mold Conveyor, 100 ft. long x 16 ft. wide, with 19 x 26" pallets, 36" on centers
1—Bucket Sand Elevator, 50 ft. tall, complete
4—Heavy Duty Flexible Shaft Grinders 2 H.P.
Ingersoll-Rand air hoists, 2, 3, 5 ton cap.

CLIFTON MACHINERY CO.
1023 W. SIXTH ST. CINCINNATI 3, OHIO

EQUIPMENT FOR SALE

1—Clearfield 4' Muller
1—Sandcutter 72"
1—Mummert Dixon Swing Frame Grinder
1—Gagger Bending machine, motorized Transite Core plates, various sizes
1—10 Ton Bottom Pour Ladle
Always in the market for good used Foundry Equipment
Send for our list #11

UNIVERSAL MACHINERY & EQUIPMENT CO.
320 E. Broad St. Shillington, Reading, Pa.,
Phones 3-0311 4-0146

MAGNETIC SEPARATOR

1—Model 5-14-46 tote all scrap saver powered by 2HP-3PH-60 cycle-220 volt geared head motor.

LADLES

2—Taper covered ladles with model C gearing—"V" type bail M289-#C48043

WOODRUFF & EDWARDS, INC.
119 N. STATE ST. ELGIN, ILLINOIS

SAND BLAST EQUIPMENT

Pangborn 28 GK2 Rotoblast Barrel, complete with Loader and $4,000.00 spare parts. A-1-Condition.—$5,000.00.
Pangborn 7GK2 Rotoblast Barrel with Loader, used very little.—$3,950.00.
Pangborn Direct Pressure Tank, Model AQ1, Excellent condition.—$575.00.
Wheelabrator No. 2 Tablast. Good condition—$3,000.00.
Wheelabrator Tumblast 15 x 20, with dust collector, $1,250.00.
Sly Sand Blast Double Room, 8 x 8, 30% of list price.
Sand Blast Cabinets and Dust Collectors, all kinds and sizes, like new, 40% of list price.
If you are interested in savings of 25% to 70% on your Sand Blast replacement parts (Wheelabrator, Pangborn, etc.) write imediately, stating type, size of your Sand Blast Machine (Tumblast, Tablast, etc.) and we will mail listing of parts available for your equipment.

DIAMOND SANDBLAST CO.
5654 W. JEFFERSON AVE.
DETROIT 9, MICHIGAN

FOR SALE

3—20" x 27" American Wheelabrators With Dust Collectors—New in 1948. Used very little—These machines are in practically new condition.
Price .....Ea. $2500.00

BALCHER MACHINERY COMPANY
1884 S. COMPTON ROAD
CLEVELAND HEIGHTS 18, OHIO
TELEPHONE: FAIRMOUNT 1-1186

FOR SALE

One Herman rollover moulding machine, late model, in excellent condition, size 40 x 58" 3740 pounds rollover capacity. Equipped with air clamps. Offered at bargain price. Address: Box 861, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Blaw-Knox ¾ c.y., size 306-1, single line, hook-on-type. Complete with cable and hook-on-yoke. Bowl counterweight. No teeth. Recommended for rehandling foundry sand. Wt. 2800 lbs. New, guaranteed. Cost...$1,470.00. A bargain at $1,000.00. Address: Box 951, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE
FOUNDRY EQUIPMENT

1—B-P 13 ft. tractor Sandslinger with sand leveler and jib cranes, complete.

3—32-ft. span electric cranes and hoists to service above Sandslinger.

1—American Wheelabrator Model AA Sandcutter Size 108/73 Latest model, fully equipped.

4—Hammond double end sand grinding stands 2—5 HP, 2—7½ HP heavy duty type, 440/3/60, controls.

1—Gardner horizontal surface grinder, Model 124, 52" dia. motor and controls.

2—Modern Equipment Co. No. 7 cupolas arranged for skip hoist charging, complete with Spencer turbo-blower & Foxboro control, and Modern swivel skip hoist charger with 2000 lb. bucket, scale and weigh hopper. Sold as unit. 3000 lb. mixing ladle optional.

1—Whiting O.E.T. Crane 60 ft. span 40 ft. hoist. Outdoor type for cupola service, 440/3/60 electric 42" EC&M magnet and ¾ yd. Blaw Knox single line clam bucket available. Crane has m.g. set and magnet reel.

1—No. 2 Simpson Intensive Mixer with discharge aerator and skip hoist loader, 20 HP motor on mixer, all motors & controls

2—1500 lb. Modern Equipment Co. straight side covered and insulated geared ladles.

2—2000 lb. Modern Equipment Co. straight side covered and insulated geared ladles.

1—Parsons cloth tube Dust Arrestor Type SF No. 138, 16,500 CFM fan and motor complete.

1—AAF No. 16D Rotoclone complete with 15 HP motor and dust hopper.

1—Mortar mixer for fire clay. CM Co No 6 with 5 HP motor.

THE WILLIAMSON HEATER COMPANY
CINCINNATI 9, OHIO

For Sale

FOR SALE

50 Brummler Steel Stacking Boxes
1 Chicago Pneu. Air Compressor 585 cu. ft. at 100#—size 15-9 x 12 type O C E with 125 H.P. Syn. Motor complete with switchboard
1 Chicago Pneu. Air Compressor 85 cu. ft. at 100# with 25 H.P.—A.C. 220/60/3 Motor and Starter
1 Simpson #2 Sandmuller with gear reducer and 15 H.P. Motor
1 Beardsley Piper Stationary Sandslinger with 2 speed head, elevator and electric controls
1 Double end Stand Grinder with 5 H.P. Motor and 2—16" wheels
1 Pneumatic tire Core Carrier, 1000# Capacity
1 Gardner #24 Disc Grinder, 53"
1 99/80 Model M American Sand Cutter 220 Volt 3 phase with 75 ft. cord and plugs
1 Modern Equipment Company one ten double channel Crane—13 ft. 5 in. span
1 Electric IBM Time Clock—type 8700-5, serial 849611 with 200 card rack, 4 horns, transformer and relays
1 Pangborn Mechanical Blast Room #43 type NF with Shot elevator tank and hopper
1 International type G-24 x 12 Jolt Rollover moulding machine
1 International type G-24 x 10 Jolt Rollover moulding machine
2 Champion type J S—12 squeezers
1 Champion type J S—12P squeezers
1 Champion Stripping plate machine—26 x 33
1 SPO #508 Jolt rollover draw machine 28 x 36 x 10"
1 SPO #506 Jolt rollover draw machine 24 x 24 x 10"
1 International type PKL 12 x 5½" jolt squeeze pin lift machine
1 One ton electric crane and hoist 50 ft. span
1 Drawer type gas core oven
1 Large Royer
1 Small Royer
1 30 x 84 tumbling mill
1 Chicago Pneu. 5 ton hoist with trolley

WRITE: BADGER FOUNDRY COMPANY
WINONA, MINNESOTA

Location of equipment:
BADGER FOUNDRY COMPANY
1331—18th STREET
RACINE, WISCONSIN

FOR SALE

1—Pangborn 9' diameter "LG-14" practically new, Multi-table rotoblast machine, complete including all motors, etc.

1—Dust collecting system

1—Lot spare parts

10—tons No. C-120 metallic grit used in this equipment.

THE UDYLITE CORPORATION

2501 E. GRAND BLVD., DETROIT 11, MICH.

C. A. SHAFER, DIRECTOR OF PURCHASES

FOR SALE
RUBBER BELTING

710 ft. piece 20" x 4 ply, 28 oz. duck 1/32" x ¼" cover, like new—U. S. Rubber Co. Security trand, $2.60 lineal ft. or will trade for 24" belt. Address: Box 969, The FOUNDRY, Cleveland 13, Ohio.

REBUILT EQUIPMENT

1—#7 Whiting Cupola with Blower & Skip Hoist
1—Stationary Sand Slinger, single belt
1—Lot Ladles—3-5-10 & 15 ton
1—American Rod Straightener with gagger attachment
International Molding Machines, portable type G, 20" & 24"
1—#1 Simpson Mixer
1—#40 Speedmullor
1—Osborn Core Blower #193
1—27 x 36 Wheelabrator (Rebuilt)

RAY P. SCULLY
SCULLY MACHINERY & EQUIPMENT CO., NOT INC.
767 MILWAUKEE AVE. CHICAGO 22, ILL.
PHONE: CANAL 6-0314

FOR SALE

One Johnson & Jennings Co., molding machine No. 918, excellent condition. Make us an offer. For further information, write or call: The Treaty Company, Greenville, Ohio.

Classified Advertising

For Sale

MAGNESIUM FOUNDRY EQUIPMENT

MOLDING MACHINES

5 "Grimes", mod. C-216 rollover
7 "Grimes", mod. C-414 rollover
5 "Johnston & Jennings", mod. 918 jolt rollover, pattern draw
2 "Johnston & Jennings", mod. 610 air draw type
5 "Osborn", mod. 275J jolt squeeze
2 "Osborn", mod. 405 jolt rollover
3 "Osborn", mod. 405-77 jolt rollover, pattern draw
2 "Osborn", mod. 560-20 jolt stripper
4 "Osborn", mod. 602 jolt rollover
4 "Davenport", mod. 40SA jolt rollover, pattern draw
1 "Davenport", mod. 40AJS jolt stripper
1 "Milwaukee", mod. 60B-3 jolt rollover draw
1 "Tabor", 10" special shockless, jar squeezer
2 "Tabor", split pattern jolt squeeze. Patt. size 13" x 18'

CORE MACHINES

1 "Tabor" pedestal type rollover
1 "Redford" #1 cartride core blower
1 "Demmler" core blower 3A

FURNACES & OVENS

9 "Hausfeld", 100# cap. pot type melting—oil fired
20 "Hausfeld", 200# cap. pot type melting—oil fired
4 "Hausfeld", 400# cap. pot type melting—oil fired
4 "Hausfeld", 1000# cap. tilting type melting—oil fired
6 "Hausfeld", 1200# cap. tilting type melting—oil fired
4 "G.E." elec. heat treat elevator type, basket size 60" W x 72" x 60" H
2 "Despatch" heat treat box type, work space 6'-6" W x 13' D x 7'6" H
1 "Gehnrich", 1, compt. preheating—gas fired

SAND MIXERS

2 "Simpson" #2 sand mixers
4 "Simpson" #1½ sand mixers

MISCELLANEOUS EQUIPMENT

10 "Newcomb David" wet dust cabinet collectors with pumps, blowers and motors.
1 "Kane & Roach" #5DX wire straightener
3 "Sly" sand blast rooms, 8' x 8'
8 Overhead traveling cranes, 1, 2 and 4 ton cap.
Misc. air hoists and material handling equipment
1 Shakeout "Simplicity", mod. "B", 4' x 6' with 5 hp mtr.
5 Jib cranes with 2 ton air hoists
1 Car spotter "Link Belt" #10 special portable with 10 hp motor.
1 Porta Trough Conveyor, belt type, mod. 334-T, 18"W x 35'L with 5 hp motor. Conveyor is mounted on 2 wheel truck
8 Cranes, overhead traveling, bridge type, approx. 38' span 1, 2 and 4 ton cap.
5 Cranes jib type with 2 ton air hoists
1 Compressor, "Spencer Turbo", 1000 CFM at 24 oz with 10 hp mtr.
1 Compressor, "Spencer Turbo", 950 CFM at 12 oz with 5 hp mtr.
1 Dust collector, "Schmeig" Centri-Merge #112S, 1000 CFM with 3 hp mtr.
2 Embossing machines "Roovers" ¼" size bench type
1 Scale, bench dial type "Fairbanks", 125# by 2 oz. graduations
1 Wire Cutter, "Hendley & Whitmore" #46-6" with 3 hp motor
1 Wire Straightener, Climax #2A

ROHN ALUMINUM & BRASS CORP.
1400 LAFAYETTE BLDG. DETROIT 26, MICH.

FOR SALE

#4 Whiting cupola, Whiting elevator, Sly sandblast room, type F magnesium furnaces, Lanly normalizing oven, saw-filing machine, miscellaneous foundry equipment. Address:

RIDGE CASTING DIVISION
MINERAL RIDGE, OHIO

FOR SALE

DUST COLLECTOR. American Air Filter type W roto clone, arrangement D. Wet system. Capacity 6000 CFM. Equipped with stainless steel impeller blades. Only slightly used. Excellent condition. Price quoted, without motor or electrical controls on request. Address: UNIVERSAL FRICTION MATERIALS COMPANY, 303 WEST RUSH STREET, KENDALLVILLE, INDIANA.

For Sale

STEEL FLASKS—FOR SALE

We have recently purchased a complete inventory of flasks (mostly Sterling) in sizes from 10" x 26" to 50" x 60" and round flasks from 18" to 24" in diameter. These flasks are in very good condition and were in use until foundry operations of a large Massachusetts manufacturer were discontinued. To move this large stock of about 3500 flasks, we are offering all or any quantity thereof at very reasonable prices. For further details, address: Box 958, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

An unequaled opportunity to purchase an 18' table Pangborn rotoblast cleaning machine. Ten years old and now operating. Our price less than 20% of replacement cost.

HETZ CONSTRUCTORS INC.
BOX 671 WARREN, OHIO

FOR SALE

One Whiting cylindrical pouring ladle with E-Z pour tipping mechanism and shifting cover. Ladle is 28 inches in diameter by 32 inches long, with 1550 lbs. capacity.

FERRO MACHINE & FOUNDRY INC.
3155 EAST 66TH ST. CLEVELAND 27, OHIO
PHONE: MICHIGAN 1-1000

FOR SALE

Spare parts for No. 3 Johnston & Jennings molding machine, all new as follows:
1 cut off valve complete, 1 jolt guide pin, 7 guide pins, 1 pattern table, 2 draw plungers, 2 piston bottom plates, 4 jolt piston rings, 2 draw plate guides, 1 leather boot and 1 2 inch U. S. vibrator.

BOX 950
THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE—PANGBORN ROTOBLAST

Due to process change, we have for immediate sale one Pangborn type LG-14 Rotoblast with 6 rotating tables, complete with dust collecting system, motors, controls, etc. Also spare parts. New Feb. 1948, used less than 6 months. Write or wire for details:

PURCHASING AGENT
A. S. CAMPBELL CO. INC.
161 PRESCOTT ST.
EAST BOSTON, MASS.

FORCED SALE—BUILDING SOLD

1 Beardsley-Piper M-B 30 Mulbarrow with extra barrow $600.00
1 51" Whiting Cupola (unlined), reconditioned with motor, blower and approximately 1500 new Cupola Blocks, all for $600.00
1 Whiting Coupler 4' x 5' with motor and reducer $275.00
1 Simplicity 2' x 3' Shaker Screen (new) with motor. Save 1/3rd.
34 Sets new and used Slip Flasks (mostly Fremont Mag.) with jackets and 2,000 Bottom Boards @ 1/3 cost. (Complete equipment for a factory.)
1 Tabor 16" abrasive cut-off, Serial #22979 ..... $250.00
15 Molding Machines (3 j.n.j. jack rabbits) ..... $25.00-$200.00
1 Buell Dust Collector System Blower and Motor $250.00
3 Modern Pouring Devices $300.00

Scale, Fire Brick, Ladles, grinders, Blowers, Motors (1-25 h.p.) many enclosed b.b., Cranes, Air and Electric Hoists. Many other tools, supplies and Equipment, all at 420 E. Cady St., Northville, Mich. Write for complete list.

J. O. STEPHENSON FDRY. & MFG. CO.
548 E. FORT ST., DETROIT 26, MICH.
WOODWARD 2-6437

FOR SALE

We are offering for sale three brick Coleman rolling drawer core ovens. There are five rolling drawers to each section—total of 15 drawers with ten additional auxiliary shelves for adapting drawers to various size cores. Drawer dimensions are 44" x 72". We will erect these ovens for either gas, coal, coke or oil fired. Equipment is in first class condition.

HARRY WESTHEAD & SON
5383 SUMMIT ROAD CLEVELAND 24, OHIO

For Sale

MACHINERY & EQUIPMENT FOR SALE

	DESCRIPTION	PRICE
3	Holden Aluminum Melting Furnaces, 250 Lb. capacity, complete w/lining and atmospheric gas burners. Each	$150.00
1	Fisher, Type HNP, Size 200, Hydraulic tilt type Brass Melting Furnace	1,100.00
1	Demmler Core Blower, No. 1 complete w/8½" Dia magazine (Practically New)	800.00
300	Aluminum Core Plates, 12"x15½", permanent Mold cast, machined two sides ..... Each	2.00
2	International Core Rollover, Hand Operated, size 14" x 8" Type R...Each	175.00
2	Sly Tumble Blast, No. 4, 20" Diam. barrel, 19" long, complete w/hopper, ½ HP motor, reducer drive.....	350.00
1	Simplicity Shake Out, Model 55, 3' x 5', complete w/1 HP motor	900.00
1	Porter Cable Wet Belt Surfacer, No. B-6W, complete w/1 HP motor	175.00
1	Johnson Horizontal Band Saw, Metal cutting, Model J	275.00
1	Milwaukee Sprue Cutter, Model H, complete w/2 HP motor	175.00
1	Beardsley & Piper Mulbaro, complete w/2½ HP motor	800.00
1	Master Floor Rammer, Air actuated	100.00
1	American Sand Cutter, Model AA, Size 5'2", complete w/cable and 10 HP motor	2,000.00
1	Boice Crane Jointer, 6" complete w/stand and ½ HP motor	100.00
1	Delta Combination Wood & Metal Cutting 14" Band Saw, complete w/6" Height extension and 1 HP motor..	175.00
1	Delta Combination Wood & Metal Cutting 14" Band Saw, complete with 1 HP Motor	150.00
1	Wiggelworths Vertical Milling Machine, No. 3 complete with 3 HP motor	400.00
1	Curtis Compressor, 12.5 cu ft., two stage, complete w/3 HP motor.....	275.00
7	Matthews 16" wide, 2½" Roller Conveyor sections, 8 ft. long, complete w/30" supports .....Each	28.50
2	South Bend Ventilating Fan, 36" diam., 4 blade duct type w/cold air duct for 1½ HP motor .....Each	150.00
1	Tabor push up molding machine....	700.00
1	—Serely Abrasive Cut-off.....	100.00

PROGRESS PATTERN & FOUNDRY CO.
1457 MARSHALL AVE., ST. PAUL E4, MINN.

FOR SALE

1—Whiting 2 ton crane 18'2" span, minus gear case
3—#601 Osborn molding machines, jolt rollover
1—Beardsley & Piper #50 speedmuller
3—#J275 Osborn jolt squeeze molding machines
3—Swing frame grinders 24" wheel 15 HP, DC
3—#G-104 International jolt rollover machines, 36 x 12"
2—Johnston & Jennings #918 jolt rollovers
2—Johnston & Jennings #815 jolt rollovers
4—Herman jolt rollovers 40 x 50" table
3—Osborn 2047-1 rollovers

BOX 946
THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

COMPLETE ALUMINUM FOUNDRY
3 CAMPBELL-HAUSFELD 1,000 lb. tilting cast-iron pot furnaces (1 with power tilt)
10 new melting pots
15 ton brand new Firebrick
Air blowers, manifolds, fuel meters, hand ladles, crane, chain hoist, piping, overhead trolleys, etc. MUST BE SOLD.

MR. ZOLLER
AIRCRAFT COMPONENTS, INC.
BENTON HARBOR, MICHIGAN

FOR SALE

10 Used Osborn Jolt Rollover Machine Serial Numbers, 8112 MM, 10115 E, 10080 H, 10080 L, 10115, 10260 S, 10260 C, 10216 D, 10260 R and 10216 C.
2 Used Osborn Moulding Machines No. 203, Serial No. 10291 J&K with Air Cylinders and Valve Control.
2 Used Johnson & Jennings Jolt Squeeze Molding Machines, Serial Nos. 2724 and 2725.
1 Portable Jolt Rollover Pattern Draw Moulding Machine No. 610 B, Serial No. 2933.

WOLF COMPANY
Chambersburg, Pa.

Classified Advertising

For Sale

EQUIPMENT FOR SALE
PANGBORN SHOT BLAST ROOM
New—never installed. Size 12′ x 25′ with two blast chambers, complete with new Pangborn Dust Collector, 60 cycle A.C. motors.
BEARDSLEY & PIPER SANDSLINGER
Motive Jr. track traveling type; had very limited use—excellent condition.
WOODWORKING MACHINERY
Includes Band Saw, Table Saw, Planer, Swing Saw, Router, etc.
Other Equipment:—
6—Geared Ladles, 1, 1½, 2 and 2½ ton Whiting Ladle Truck
2—Grab Buckets
5—Budgit Electrical Hoists, ½ and 1 ton
10 H.P. Buffalo Blower-Exhauster
3—No. 5 Hauck Torches
8—Molding Machines
American Rod Straightener
2—Gast Core Oil Sprayers
42" American Sand Cutter
F-M Crane Scale
14 ft. Portable Belt Conveyor, motorized
7 section Roller Conveyor
Complete Laboratory
Mold Wash Mixer
5-48" Exhaust Fans (new)
Chipping Hammers and Air Hammers
For information address **MR. M. R. GAULT, HANNIFIN CORPORATION, 1101 SO. KILBOURN AVE., CHICAGO 24, ILLINOIS. TELEPHONE NEVADA 8-0406.**

FOR SALE OR LEASE
IRON FOUNDRY WITH

42,000 square feet
in buildings. Fully
equipped and ready
to run with experienced
personnel located
in a city of 5,000
with a desirable
labor market

JOHN WESTWICK & SON, INC.
GALENA, ILLINOIS

FOR SALE
Two electric Detroit rocking furnaces, 500 lb. capacity, including all switch boxes, conduits and transformers. Used three months—like new. $4,000.00 each or $7,500.00 for both. ADDRESS: MAGNA INC., 129 E. SAN FERNANDO, SAN JOSE, CALIFORNIA.

FOR SALE
145—Sterling Steel Flasks—1 Pin on each side —12 x 18, 3 Cope & 3 Drag.
119—Truscon Steel Flasks—1 Pin on each side —12 x 18, 3 Cope & 3 Drag.
These Steel Flasks are practically new.
2—Tabor, Air Jolt, Rollover Machines 14 x 16 Table.
1—Pouring Device.
1—Globe Tilting Water Tumbler.
1—American Sand Cutter, Gasoline Driven.
1—Johnston & Jennings 24 x 30 Rollover.
1—Tabor 30 x 40 Rollover Machine.
1—27 x 36 Wheelabrator.
1—#9 Whiting Cupola complete with Motor, Blower, and Blast Regulator.
10—"G" Power Rollover Machines.
15—Jolt Squeezers of most any make.
4—Automatic lift truck with charger.
1—50" Moulder's Friend Sand Cutter with 15 HP Motor.
1—Grinding Wheel Stand 3 x 24" Wheels.
1—Marshke Swing Grinder with 5 HP Motor.
1—Stearns Magnetic Pulley, New, Serial #20442, 125 volts, RPM 40. Manufactured by Stearns Magnetic Mfg. Co., Milwaukee, Wisconsin.
1—Motor Generator Model #498 Induction motor generator set ¾ KW diverter pole generator. 125 volts @ 6 amp DC with 1½ HP 220/440/60/30 Across the line motor. New.
Osborn 558 and 559 Jolt Strippers.
Belting, New, 187 Ft. Ajax 20" 5 Ply 28 oz. conveyor belting with ⅛" top and 1/32" bottom cover.
J.D.P. International Jolt Strippers.

HAYNES FOUNDRY EQUIPMENT CO.
814 ADA ST. KALAMAZOO 52, MICH.

For Sale

FOR SALE
1—10 H.P. Motor and Blower
2—Rapid Molding Machines
2—Osborn Molding Machines
1—2 H.P. Motor 60 Cycle
50—Assorted Flasks

RELIANCE LEAD SOLDER & BABBIT CO.
339 GENESEE ST. BUFFALO, N. Y.

FOR SALE
2", 3", 4" drop pattern soil pipe machines, core machines, arbors, flasks, core knives, etc. We will manufacture any quantity desired.

BOX 962
THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE
Pangborn repair parts (new), Master gearhead motors (used) and Cutler-Hammer electrical controls (used), for type GK-21 Pangborn Rotoblast, 48" by 54" barrel.

GREDE FOUNDRIES, INC.
P. O. BOX 443 MILWAUKEE 1, WISC.

FOR SALE
5—OSBORN ROLLOVER JOLT MOULDING MACHINES.
Stationary, model 2047-1. Flask space 22½" x 21½" draw 11½".
These machines are like new and are priced for a quick sale at $225.00 each. Original cost $2400.00 each, weight 3500 lbs. each.

CANTON INDUSTRIAL SALVAGE CO.
325 ELEVENTH ST. S.E. CANTON, OHIO

FOR SALE
TURBO BLOWERS (3 Phase, 60 Cycle)

cfm	Pressure	Make	Motor H.P.	Volts	Speed
3500	40 oz.	Spencer	60	440	1800
2200	40 oz.	Spencer	40	220/440	3600
1400	16 oz.	Spencer	220/440	3/60	3600
225	10	Spencer	1	220/440	3600

PRESSURE BLOWERS (3 Phase, 60 Cycle)

2500	7 oz.	Sturtevant	15	220/440	1800
2400	14 oz.	Mahr	15	220/440	3480
1300	16 oz.	Nth.Amer.	10	440	1800
1150	20 oz.	Nth.Amer.	10	220/440	3600
800	802	Sturtevant	7½	220/400	3600
800	24 oz.	American	10	220	3600
450	6 lbs.	A&B	30	220/440	3450
150	12 oz.	Nth.Amer.	1	220	3600

MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVENUE
CLEVELAND, OHIO

For Sale

FOR SALE
1—International type G, jolt ram, air turnover foot draw molding. Size 30" x 8" draw, portable design. New 1948. Never used.

RAVENA IRON COMPANY
RAVENA, NEW YORK

Manufacturers Representative

SALES REPRESENTATIVE
To represent a Connecticut foundry and manufacturer on brass, bronze and aluminum castings. Address: Box 914, The FOUNDRY, Cleveland 13, Ohio.

REPRESENTATIVE
To sell grey iron castings to quantity users located east of Des Moines in Iowa and Illinois. Completely modern mechanized foundry very competitive, specializing in high production machine type work. Particularly equipped to make air-cooled cylinders and cored castings. Commission basis. Address: Box 960, The FOUNDRY, Cleveland 13, Ohio.

ATTENTION MANUFACTURERS AGENTS!

Please register with The FOUNDRY stating what type of foundry equipment, supplies or accessories you now handle or would like to handle in the future.

We have many requests for the names of Manufacturers Agents and might be able to refer you to new accounts or to buyers looking for local representatives for various types of foundry equipment.

Write us today and be included in our new list of supply houses and manufacturers agents.

THE FOUNDRY
831 PENTON BLDG. CLEVELAND 13, OHIO

CLASSIFIED ADVERTISING RATES

POSITION WANTED—Minimum advertisement set solid, 30 words, $2.00. Additional words 7c each.

ALL OTHERS—"Help Wanted"—"For Sale"—"Wanted"—"Personals"—"Services", etc., minimum advertisement set solid, 30 words or less, $4.00. Additional words 12c each.

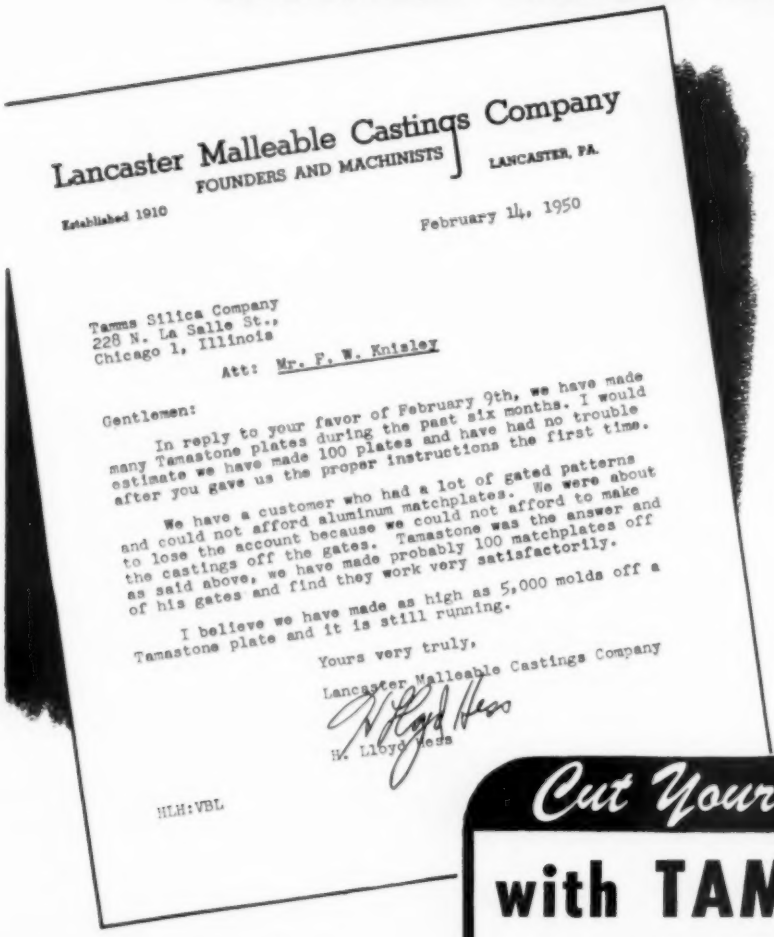
NOTE—If replies are to be sent to a box number in care of THE FOUNDRY, add 6 words to your advertisement for box number and address.

Any advertisement set in all capital letters, add 50% to the above rates.

• • •

Classified advertising forms close 13th of month preceding issue.

SUPER TAMASTONE
MAKES GOOD SHOWING!



Lancaster Malleable Castings Company
FOUNDERS AND MACHINISTS — LANCASTER, PA.

Established 1910

February 14, 1950

Tamms Silica Company
228 N. La Salle St.,
Chicago 1, Illinois

Att: Mr. F. W. Knisley

Gentlemen:

In reply to your favor of February 9th, we have made many Tamastone plates during the past six months. I would estimate we have made 100 plates and have had no trouble after you gave us the proper instructions the first time.

We have a customer who had a lot of gated patterns and could not afford aluminum matchplates. We were about to lose the account because we could not afford to make the castings off the gates. Tamastone was the answer and as said above, we have made probably 100 matchplates off of his gates and find they work very satisfactorily.

I believe we have made as high as 5,000 molds off a Tamastone plate and it is still running.

Yours very truly,

Lancaster Malleable Castings Company

H. Lloyd Hess

H. Lloyd Hess

HLH:VBL

SEE FOR YOURSELF the savings that are possible with SUPER TAMASTONE the perfect pattern compound!

- Now, you can make your own pattern equipment, with your own men, right in your own foundry.
- Now, you can make loose patterns pay big profits by converting odds and ends jobs into Super Tamastone match plates.
- Now, you can speed production up to 400% on large cope and drag moldings.

Read letter at left . . . Here's proof of profits!

DON'T FORGET . . .

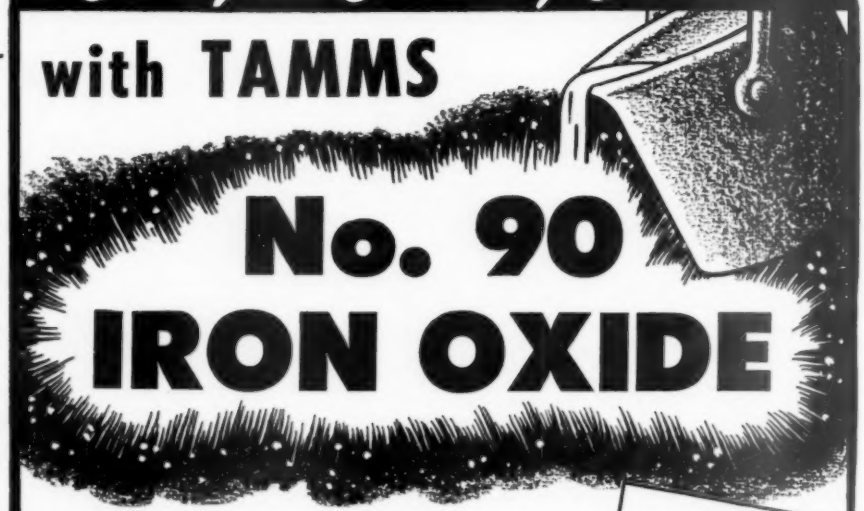
- **Tamms No. 100 LIQUID CLEANER for CORE BOXES and CORE BLOWING EQUIPT.**
- **Tamms DEMOUNTABLE FRAMES**
- **Tamms PLASTIC METAL FILLER**
- **Tamms METALINE COATING**
- **Tamms MODELING CLAY**

Write for SAMPLES!

TAMMS INDUSTRIES, INC.
(formerly Tamms Silica Co.)
228 N. La Salle St., Chicago 1, Ill.

Cut Your Cleaning Costs . . .

with TAMMS



No. 90 IRON OXIDE

TAKE A TIP . . .

from many of the nation's largest grey iron and steel foundries . . . use TAMMS No. 90 IRON OXIDE. You will get better, cleaner, higher quality castings . . . you will reduce cleaning costs . . . you will prevent core burning, veining, penetration. If you haven't already tried TAMMS No. 90 . . . write today . . . we will gladly send you a SAMPLE!

Order Today!

NO DELAYS! IMMEDIATE SHIPMENT ASSURED!

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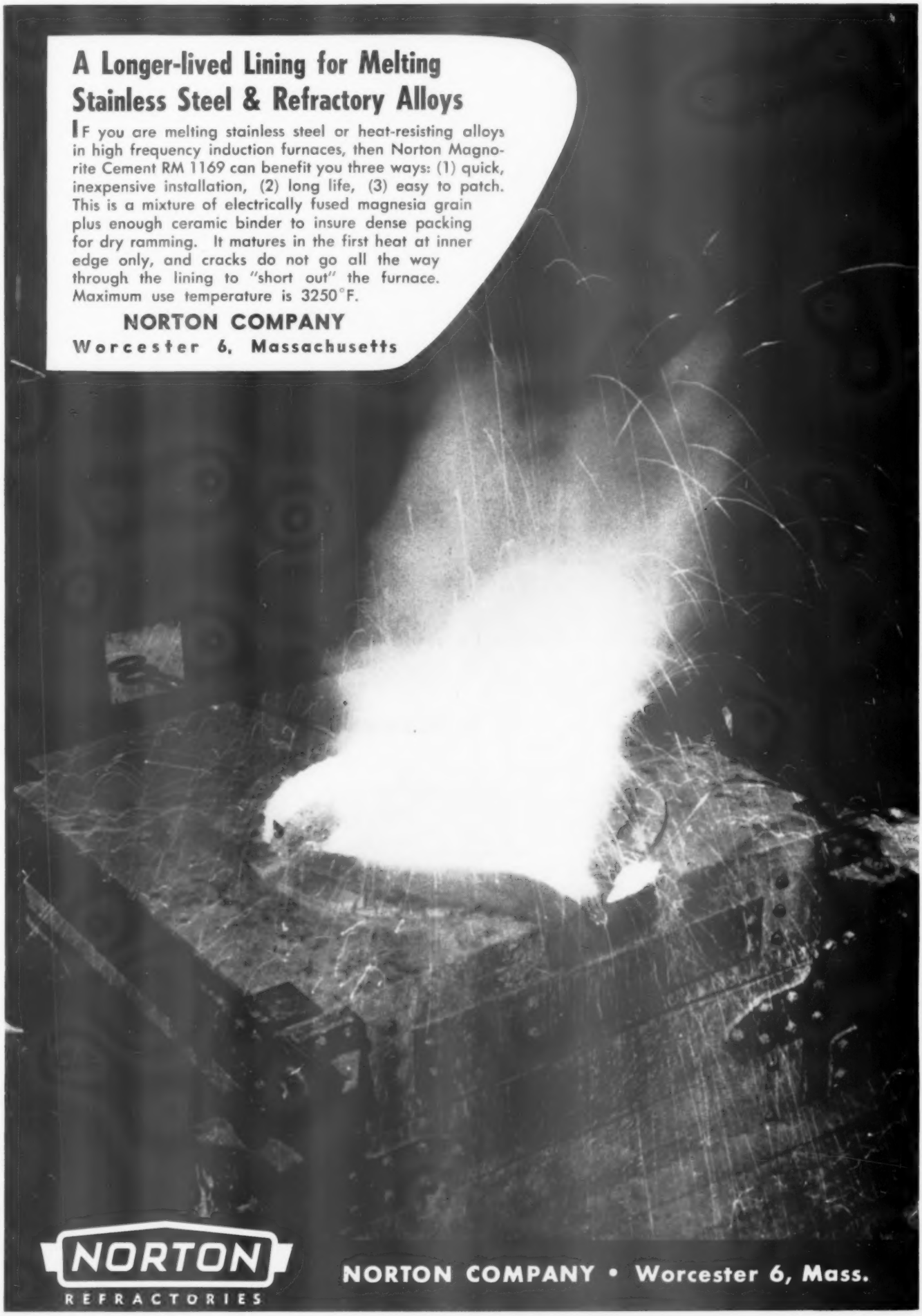
A Longer-lived Lining for Melting Stainless Steel & Refractory Alloys

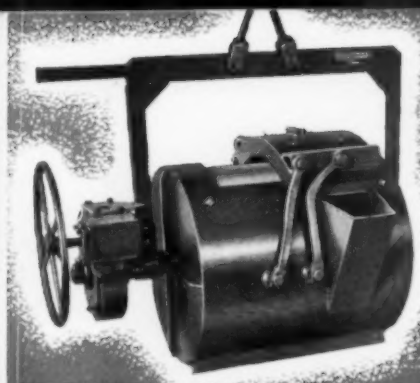
IF you are melting stainless steel or heat-resisting alloys in high frequency induction furnaces, then Norton Magnorite Cement RM 1169 can benefit you three ways: (1) quick, inexpensive installation, (2) long life, (3) easy to patch. This is a mixture of electrically fused magnesia grain plus enough ceramic binder to insure dense packing for dry ramming. It matures in the first heat at inner edge only, and cracks do not go all the way through the lining to "short out" the furnace. Maximum use temperature is 3250°F.

NORTON COMPANY
Worcester 6, Massachusetts

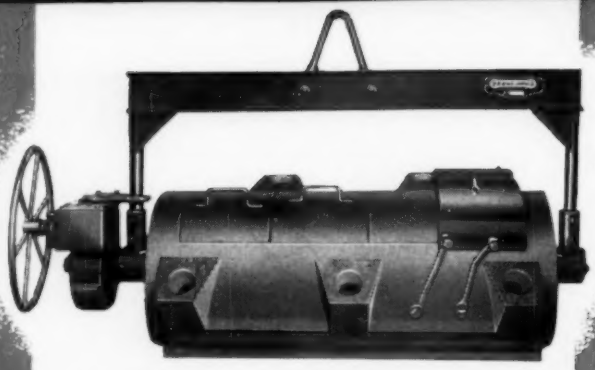


NORTON
REFRACTORIES

NORTON COMPANY • Worcester 6, Mass.

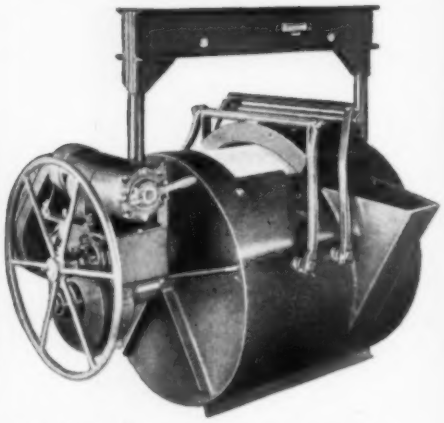


MODERN 800 lb. Geared, Covered and Insulated Cylindrical Ladle with square bail and crane-hook eye.



MODERN Special, 1500 lb. Covered and Insulated Geared Ladle with 5 Spouts.

MODERN 800 lb. Geared, Covered, Straight Sided Ladle with Square Bail and Crane-Hook Eye. Cover in open position.



MODERN 2000 lb. Cylindrical Covered Ladle with special bail. Tilted by motor or hand wheel.

The *LATEST* in LADLES

By MODERN EQUIPMENT CO.

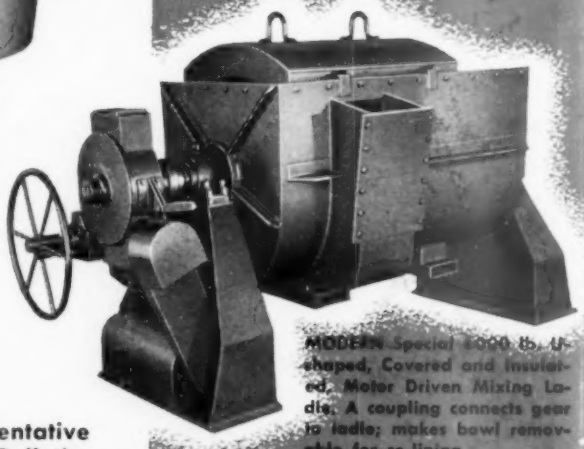
- in any Style or Capacity required.
- in step with the Foundry Industry's latest advancements in production methods and volume.
- pioneers in the design and construction of Foundry Ladles for every purpose.

MODERN 1200 lb. Geared, Single Shell, Covered and Insulated Ladle with V-Bail.

MODERN 50,000 lb. capacity, 66" top diameter, geared, tapered bottom-pour ladle.

MODERN 17½" Top-Diameter Tapered Covered Ladle with No. 1 Type Shank, Roller Bearing Trunnions and Detachable Bail.

MODERN 400 lb. Covered and Insulated Cylindrical Ladle; No. 1 Type Shank, Roller Bearing Trunnions, and Detachable Bail.



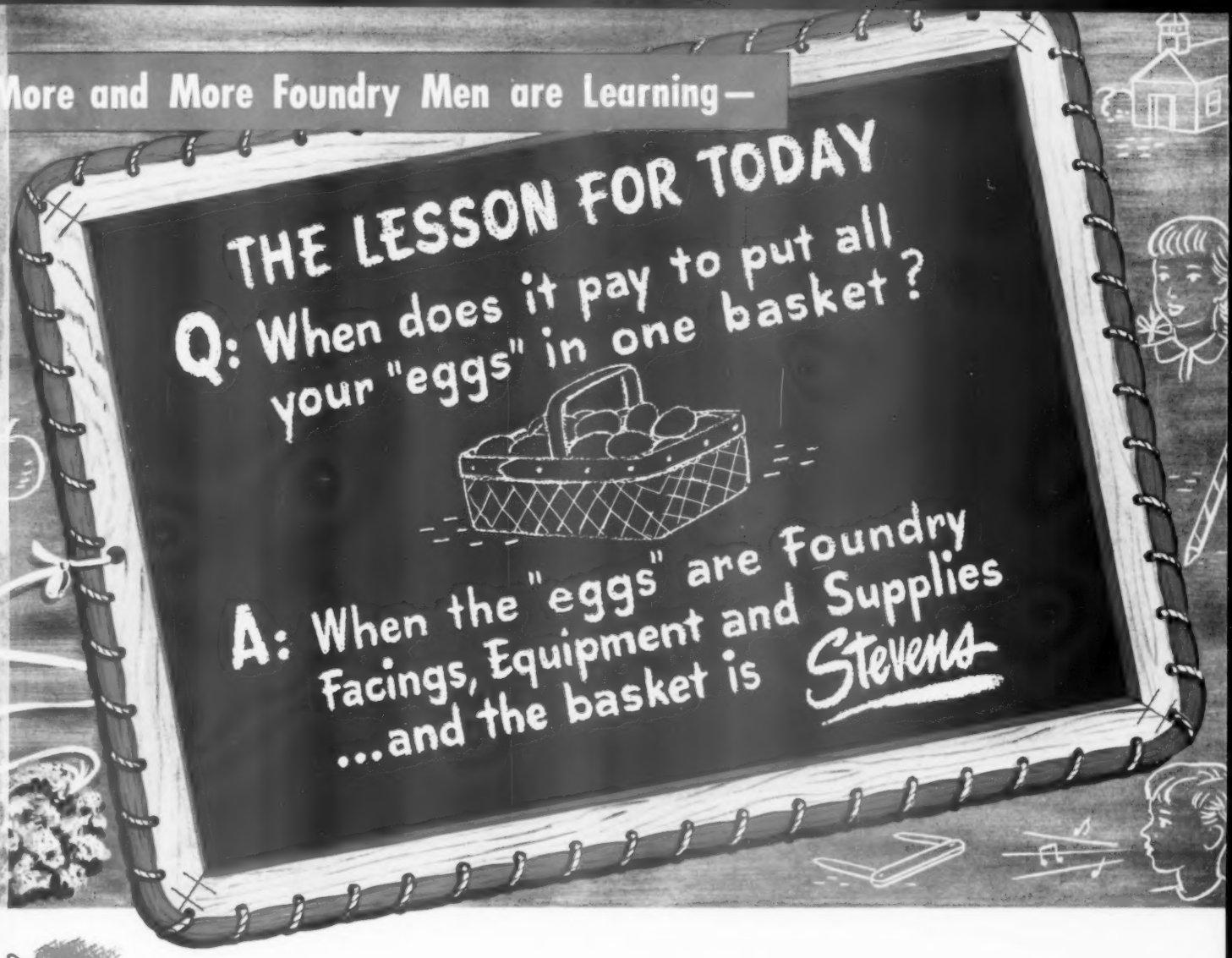
MODERN Special 1000 lb. U-shaped, Covered and Insulated, Motor Driven Mixing Ladle. A coupling connects gear to ladle; makes bowl removable for re-lining.

Ask Your MODERN Representative or Write for Latest Ladle Bulletin.

MODERN EQUIPMENT CO.

PORT WASHINGTON, WISCONSIN

CUPOLAS • CUPOLA CHARGERS • LADLES OF ALL TYPES • POURING DEVICES • METAL POURING SYSTEMS • CRANE AND MONORAIL SYSTEMS • ELECTRIC CRANES.


More and More Foundry Men are Learning—
THE LESSON FOR TODAY
Q: When does it pay to put all your "eggs" in one basket?
A: When the "eggs" are Foundry Facings, Equipment and Supplies ...and the basket is Stevens

You aren't apt to find this lesson in any book on modern foundry practice. Only knowledge born of experience can prove the wisdom of concentrating the bulk, if not *all* of your foundry equipment and supply purchases with one dependable source. For many production-minded, cost-conscious foundry operators this experience is a revelation when the "source" is Stevens.

Not only does *one source of supply* simplify engineering and purchasing problems, but *one responsibility* for all necessary equipment and supplies delivered to the job, assures you of getting a better installation and avoids needless delays. The *high quality* of each item sold by Stevens, be it equipment or a barrel of core coating, is your assurance of utmost efficiency and absolute dependability in every phase of your foundry operation.

When you consult with a Stevens Sales and Service representative you have a direct line to fast action on your foundry problems. For Stevens is an *integrated* company. Sales, metallurgy, production and shipping are closely coordinated to provide you with on-the-spot information, quick decisions and great flexibility in helping you produce better castings faster, at less cost. If it's *anything* for a Foundry—Stevens has *everything* you need!

SINCE 1882 STEVENS INCORPORATED EVERYTHING FOR A FOUNDRY DETROIT 16 MICHIGAN

LEADING MANUFACTURERS AND DISTRIBUTORS OF FOUNDRY FACINGS, EQUIPMENT AND SUPPLIES

FREDERIC B. Stevens INCORPORATED

DETROIT 16, MICHIGAN

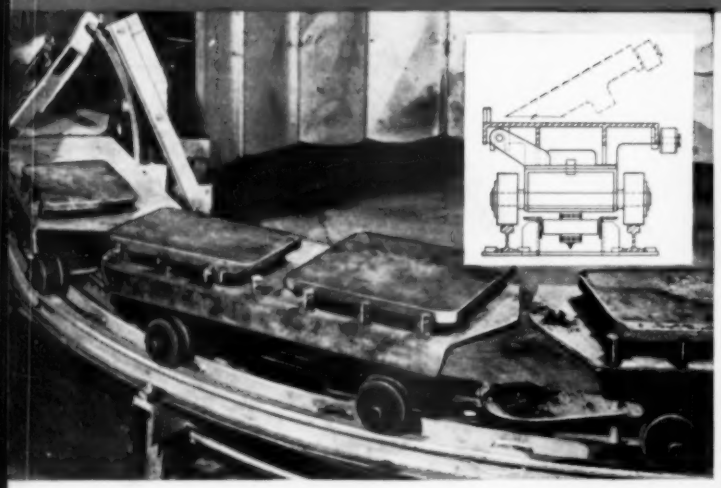
Branches • Sales Offices • BUFFALO • NEW HAVEN • INDIANAPOLIS • CLEVELAND

Representatives in Principal Cities

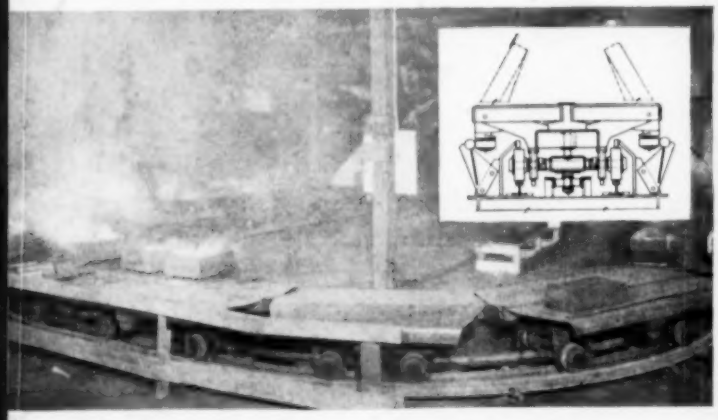
FOUNDRY FACINGS EQUIPMENT AND SUPPLIES DIVISION

4 ROUTES TO EFFICIENCY via Link-Belt Mold Conveyors

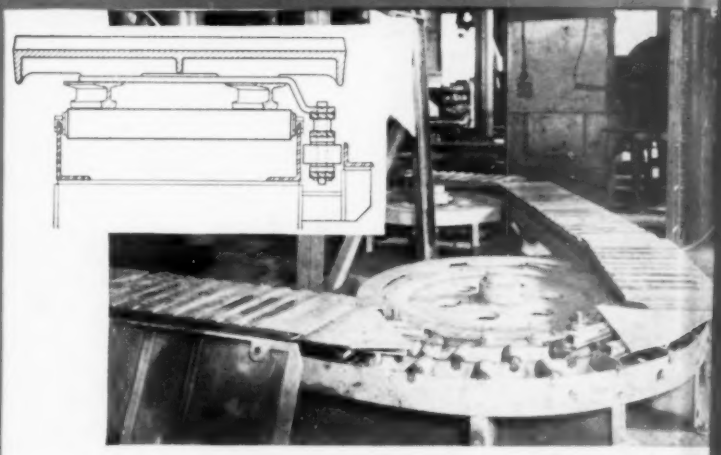
Mechanized handling that increases output, cuts costs and improves working conditions, results from the use of one or more of these standard Link-Belt mold conveyors. Link-Belt engineers will gladly aid you in laying out and installing conveying equipment to meet your exact requirements. Call on them.



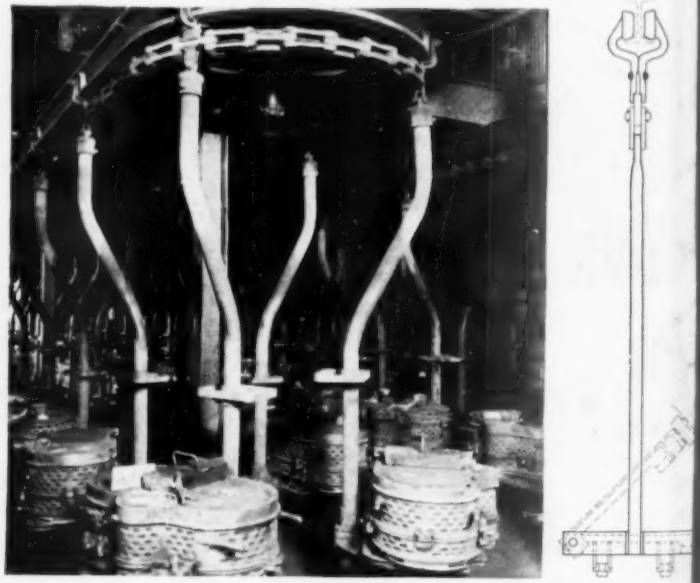
Link-Belt Tru-Trac Conveyor for molds. True rolling action of conveyor on curves, as well as on straightaways, means smooth operation without pulsation and low maintenance cost. Top plate tilted by cam for automatic discharge on loose flask work.



Link-Belt Indexing Type Conveyor for molds, combines the fine design features of a Tru-Trac Conveyor with the advantages of the molder placing molds on the conveyor and molds being poured while the conveyor is stationary. The indexing cycle assures each molder of having space for his completed molds. Divided top plate allows automatic discharge of molds when used with loose flask work.



Link-Belt rolling conveyor for molds consists of series of trays on stationary ball bearing rollers propelled by steel chain operating in guides. This type of conveyor is ideal for heavy work, has long life and maintenance costs are low.



Link-Belt Trolley Conveyor carries freshly poured molds on suspended trays while they cool. Used to advantage when long cooling periods are required, because of ability to turn sharp corners, thus using a minimum of space.

LINK-BELT COMPANY, Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities.

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THE SYMBOL OF QUALITY · LB · LINK-BELT

LINK-BELT CONVEYORS

AND PREPARATION MACHINERY

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. · MEMBER FEMA

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